IIT JAM Economics

Sample Paper – 6

Duration: 180 Minutes **Maximum Marks: 100**

Instructions

- This paper contains **60 questions** in three sections, modelled on the IIT Joint Admission Test for M.Sc. (JAM) — **Economics (EN)** paper.
- **Section A (Q1–Q30) — MCQ (Single Correct):** Q1–Q10 carry **1 mark** each; Q11–Q30 carry **2 marks** each. Wrong answers carry $-\frac{1}{3}$ mark (1-mark Qs) or $-\frac{2}{3}$ mark (2-mark Qs).
- **Section B (Q31–Q40) — MSQ (One or More Correct):** Each question carries **2 marks**. Full marks awarded only if **all** correct options are selected and **no** incorrect option is chosen. **No negative marking.**
- **Section C (Q41–Q60) — NAT (Numerical Answer Type):** Q41–Q50 carry **1 mark** each; Q51–Q60 carry **2 marks** each. Type the exact numerical answer. **No negative marking.**
- **Calculator policy:** Personal calculators, log tables, mobile phones, and other electronic gadgets are strictly prohibited. A **virtual scientific calculator** is provided on-screen. Rough sheets are supplied at the examination centre.

Section A — Multiple Choice Questions (MCQ)

- **Q1–Q10:** 1 mark each; $-\frac{1}{3}$ mark per incorrect answer.
- **Q11–Q30:** 2 marks each; $-\frac{2}{3}$ mark per incorrect answer.

Q1. Roy's identity states that the Marshallian demand for good i can be recovered from the indirect utility function $V(p, I)$ as:

(A) $x_i(p, I) = \dfrac{\partial V}{\partial p_i}$

(B) $x_i(p, I) = \dfrac{\partial V}{\partial p_i} \cdot \dfrac{\partial V}{\partial I}$

(C) $x_i(p, I) = -\dfrac{\partial V/\partial p_i}{\partial V/\partial I}$

(D) $x_i(p, I) = -\dfrac{\partial V/\partial I}{\partial V/\partial p_i}$

Q2. In a three-sector open economy with a government, the **equilibrium condition** expressed in terms of leakages and injections is:

(A) $S + I = G + T$

(B) $C + I = Y + G$

(C) $S = I$ regardless of trade and fiscal balance

(D) $S + T + M = I + G + X$ (savings plus taxes plus imports equal investment plus government expenditure plus exports)

Q3. The **Central Limit Theorem (CLT)** states that for a random sample of size n from any distribution with finite mean μ and variance σ^2:

(A) $\dfrac{\sqrt{n}\,(\bar{X}_n - \mu)}{\sigma} \xrightarrow{d} N(0, 1)$ as $n \to \infty$

(B) The sample mean exactly follows $N(\mu,\, \sigma^2/n)$ for all n

(C) The population must be normally distributed for the CLT to apply

(D) The sample median converges faster than the sample mean to normality

Q4. Find $\dfrac{d}{dx}\left[x^2 e^x\right]$.

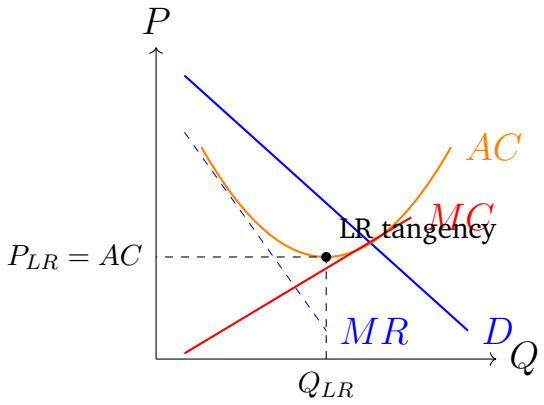
(A) $2x\, e^x$

(B) $x\, e^x(x + 2)$

(C) $x^2\, e^x$

(D) $2e^x$

Q5. In monopolistic competition, which statement correctly describes the transition from short-run to long-run equilibrium?



(A) Firms earn zero economic profit in both the short run and the long run.

(B) In the short run, $P = AC$; in the long run, $P > AC$.

(C) Long-run equilibrium requires $P = MC$ (productive efficiency).

(D) In the long run, free entry drives economic profit to zero ($P = AC$), but firms produce below minimum efficient scale (excess capacity, $P > MC$), implying allocative and productive inefficiency.

Q6. In an open economy with government (marginal propensity to consume c, marginal tax rate t, marginal propensity to import m), compared to a closed economy with no government, the government expenditure multiplier is:

(A) Smaller, because leakages from taxation and imports reduce the multiplier: $\dfrac{1}{1 - c(1-t) + m} < \dfrac{1}{1-c}$.

(B) Larger, because government spending boosts incomes.

(C) Equal to $\dfrac{1}{1-c}$, unchanged from the closed-economy case.

(D) Equal to 1.

Q7. When the Reserve Bank of India **increases the Cash Reserve Ratio (CRR)**, the direct effect is:

(A) An increase in the lendable resources of commercial banks.

(B) A reduction in the funds available to commercial banks for lending, thereby contracting the money supply.

(C) An automatic increase in the repo rate.

(D) An immediate depreciation of the Indian rupee.

Q8. Which statement correctly describes the Student's t-distribution with k degrees of freedom?

(A) $t(k)$ has smaller variance than $N(0,1)$ for all k.

(B) As $k \to \infty$, $t(k)$ converges to the chi-square distribution.

(C) $t(k)$ has heavier tails than $N(0,1)$ for any finite k; as $k \to \infty$, $t(k)$ converges in distribution to $N(0,1)$.

(D) The t-distribution is defined only for $k \geq 30$.

Q9. Solve the system $2x_1 + x_2 = 5$ and $4x_1 + 3x_2 = 11$ using **Cramer's rule**. The value of x_1 is:

(A) 2

(B) 3

(C) 1

(D) 4

Q10. The **Human Poverty Index (HPI-1)** for developing countries differs from the Human Development Index (HDI) in that:

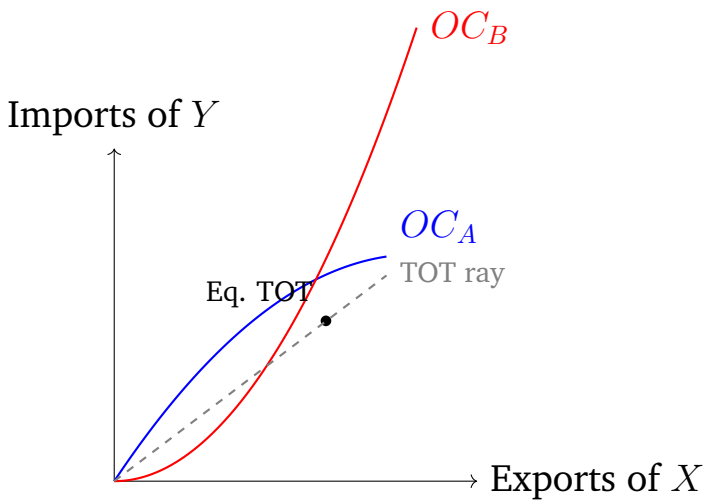
(A) HPI-1 measures average achievements in human development across the population.

(B) HPI-1 uses income per capita as one of its three components.

(C) The HDI is computed only for subgroups identified as poor.

(D) HPI-1 measures *deprivations* (the percentage of the population deprived in longevity, literacy, and basic living standards), whereas the HDI measures average achievements across the whole population.

Q11. The **offer curve** (reciprocal demand curve) of a country in international trade:



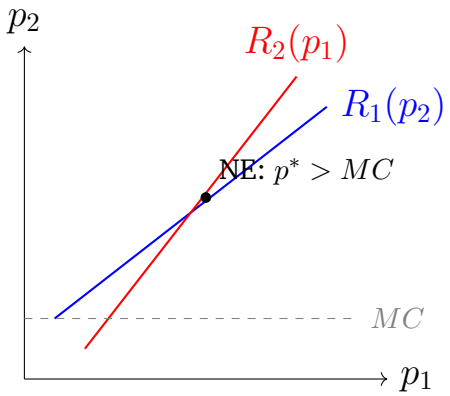
(A) Shows the relationship between export price and domestic output, holding world prices constant.

(B) Represents the combinations of exports and imports the country is willing to trade at various terms of trade, with the equilibrium terms of trade determined where the two countries' offer curves intersect.

(C) Always has a unit slope at every point along its length.

(D) Is identical in shape to the country's production possibility frontier.

Q12. The **Bertrand paradox** (duopoly with identical goods and constant marginal cost yields $P = MC$ and zero profit with only two firms) is resolved when:



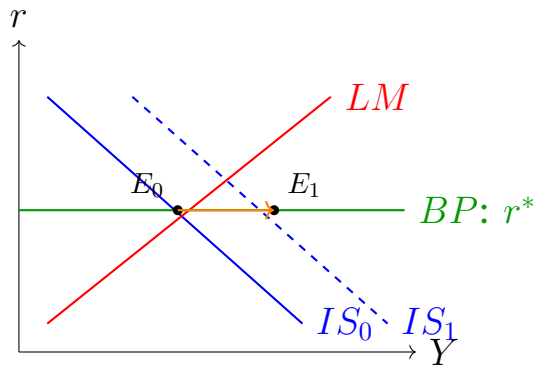
(A) Firms offer *differentiated* products, giving each firm some pricing power so that the Nash equilibrium price exceeds marginal cost.

(B) Firms collude to set the monopoly price through a binding cartel agreement.

(C) The number of firms increases beyond two, driving the market to perfect competition.

(D) Fixed costs are zero, so firms can freely enter and undercut each other.

Q13. In the **Mundell-Fleming model** with perfect capital mobility and a **fixed exchange rate**, which statement is **correct**?



(A) Fiscal policy is ineffective because it completely crowds out net exports (as under a flexible exchange rate).

(B) Monetary expansion permanently raises output above potential.

(C) The BP curve is upward-sloping under perfect capital mobility.

(D) Fiscal policy is highly effective (full multiplier, no interest-rate crowding out) because the central bank accommodates money demand to maintain the fixed exchange rate.

Q14. Schumpeter's concept of **"creative destruction"** in the theory of economic growth implies:

(A) Capital depreciation is the primary driver of long-run economic growth.

(B) Central government planning is essential for inducing innovation.

(C) Innovations introduced by entrepreneurs render existing products and processes obsolete, driving economic growth through continuous structural change.

(D) Economic growth is always steady and continuous, with no disruption to existing industries.

Q15. Which statement about the **Durbin-Watson (DW) test** for serial correlation is **correct**?

(A) The DW test is valid when the lagged dependent variable appears as a regressor.

(B) A DW statistic close to 2 indicates the absence of first-order serial correlation in the residuals.

(C) The DW statistic ranges from -1 to 1.

(D) A DW statistic close to 0 indicates negative first-order autocorrelation.

Q16. For a constrained maximisation problem $\max f(x, y)$ subject to $g(x, y) = 0$, the second-order *sufficient* condition for a maximum (given first-order conditions are satisfied) is:

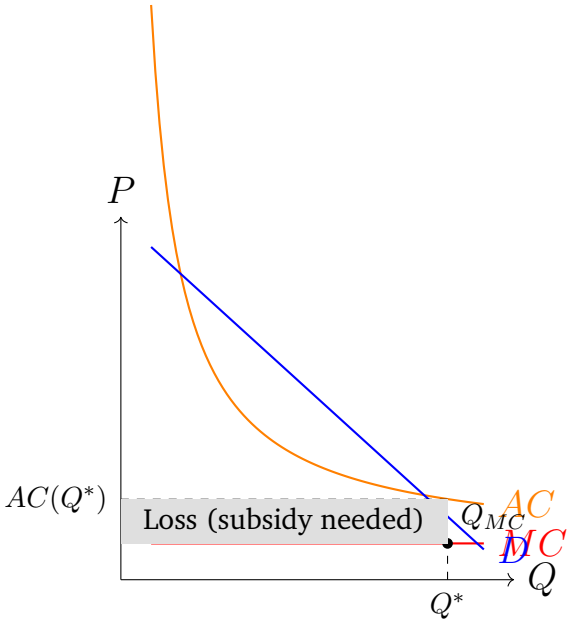
(A) The unrestricted Hessian of f is negative definite everywhere.

(B) f is a linear function of x and y.

(C) The bordered Hessian of the Lagrangian has a positive determinant (ensuring the critical point is a constrained maximum).

(D) The constraint $g(x, y) = 0$ is non-binding at the optimum.

Q17. When a regulator requires a **natural monopoly** to price at marginal cost (first-best pricing):



(A) The firm incurs economic losses because $P = MC < AC$ (declining AC means $AC > MC$), requiring a government subsidy to keep the firm operational — this achieves allocative efficiency at the cost of public funds.

(B) The firm earns positive profit because demand is sufficiently large.

(C) The firm achieves productive efficiency with no need for a subsidy.

(D) Allocative efficiency is sacrificed but productive efficiency is achieved.

Q18. In Modigliani's **Life Cycle Hypothesis (LCH)**, the individual consumption function is best characterised as:

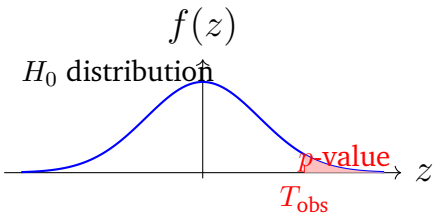
(A) $C = \alpha + \beta Y$, where β is the MPC depending only on current income (Keynes' AIH).

(B) $C = \kappa \cdot Y^P$, where Y^P is permanent income (Friedman's PIH).

(C) $C = Y/(1 + r)$, discounting all future income at rate r.

(D) $C = (W/T) + (R/T) \cdot Y_L$: consumption is proportional to total lifetime resources (current wealth W plus the present value of remaining labour income), implying the APC declines with current income.

Q19. The p**-value** of a hypothesis test is defined as:



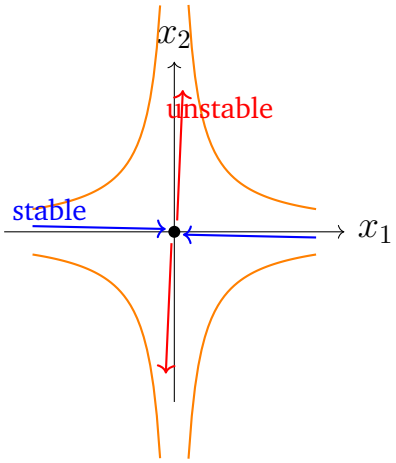
(A) The probability that the null hypothesis H_0 is true.

(B) The probability of observing a test statistic at least as extreme as the computed value, assuming H_0 is true.

(C) The probability of committing a Type II error (β).

(D) One minus the significance level α.

Q20. An equilibrium of the two-dimensional linear system $\dot{\mathbf{x}} = A\mathbf{x}$ is a **saddle point** if:



(A) Both eigenvalues of A are negative (stable node).

(B) Both eigenvalues of A are positive (unstable node).

(C) The eigenvalues of A are real with opposite signs ($\det(A) < 0$); trajectories approach the equilibrium along one direction but diverge along another.

(D) The eigenvalues of A are complex conjugates with positive real part (unstable spiral).

Q21. The **Revelation Principle** in mechanism design states that:

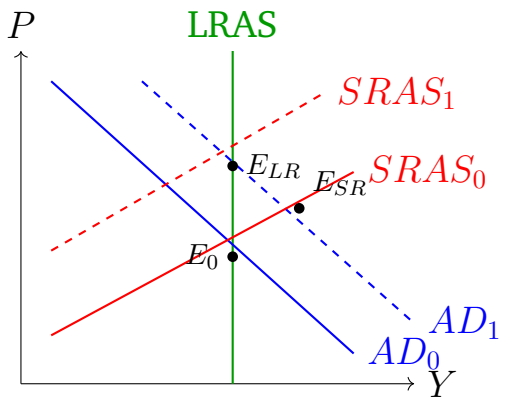
(A) For any Bayesian Nash equilibrium of any mechanism, there exists a direct revelation mechanism (where agents report their types directly) in which truthful reporting is also a BNE and yields the same outcome.

(B) Truthful reporting is always a dominant strategy in every possible mechanism.

(C) The optimal mechanism always requires at least some agents to misreport their types.

(D) Only direct revelation mechanisms can satisfy incentive compatibility.

Q22. In the AS-AD model with **adaptive expectations**, the **long-run effect** of a permanent monetary expansion is:



(A) A permanent increase in real output with a constant price level.

(B) A decrease in the price level accompanied by an increase in real output.

(C) No change in either the price level or real output.

(D) An increase in the price level with no permanent increase in real output (money is neutral in the long run), as wages and prices fully adjust to restore the economy to potential output.

Q23. For a single observation from a $\mathrm{Bernoulli}(p)$ distribution, the **Fisher information** $I(p)$ equals:

(A) $p(1-p)$

(B) $\log\left(\dfrac{p}{1-p}\right)$

(C) $\dfrac{1}{p(1-p)}$

(D) $p^2(1-p)$

Q24. A 2×2 matrix A is said to be **nilpotent** if:

(A) $\det(A) = 0$ and $\mathrm{tr}(A) \neq 0$.

(B) $A^k = 0$ for some positive integer k; equivalently, all eigenvalues of A are zero (and for a 2×2 nilpotent matrix, $A^2 = 0$).

(C) A has two distinct eigenvalues, both negative.

(D) A is symmetric with all zero diagonal entries.

Q25. Which statement about India's **Foreign Direct Investment (FDI)** policy reforms after 1991 is **correct**?

(A) Post-1991, India progressively liberalised FDI policy, allowing automatic approval in many sectors up to sectoral limits, replacing the earlier case-by-case government (FIPB) approval route for most sectors.

(B) India nationalised all foreign-invested enterprises after the 1991 reforms.

(C) FDI inflows into India have been restricted exclusively to export-oriented units.

(D) India does not permit FDI in the services sector.

Q26. Which statement **correctly** distinguishes the **Wholesale Price Index (WPI)** from the **Consumer Price Index (CPI)** in India?

(A) WPI measures price changes at the retail level paid by final consumers.

(B) CPI excludes food and fuel prices from its basket.

(C) Both WPI and CPI use identical commodity weights and basket compositions.

(D) WPI measures price changes at the wholesale (producer/trader) level and covers traded goods including fuel and manufacturing, while CPI measures retail prices paid by final consumers and assigns higher weight to food and services.

Q27. Which classification **correctly** maps the four types of goods based on rivalry and excludability?

	Excludable	**Non-excludable**
Rival	Private goods (food, clothing)	Common resources (fisheries, groundwater)
Non-rival	Club goods (pay-TV, toll road)	Pure public goods (national defence)

(A) Public goods are rival and excludable.

(B) Common resources (open-access goods) are non-rival and non-excludable.

(C) Club goods are non-rival but excludable (e.g., pay-per-view TV, toll roads with spare capacity), while common resources are rival but non-excludable (e.g., fish in the ocean, groundwater).

(D) Private goods are non-rival and non-excludable.

Q28. The **Uncovered Interest Parity (UIP)** condition implies:

(A) The domestic and foreign interest rates are always equal, regardless of exchange rate expectations.

(B) The domestic interest rate equals the foreign interest rate plus the expected rate of depreciation of the domestic currency:

$$i_t \approx i_t^* + \frac{E_t e_{t+1} - e_t}{e_t},$$

where e_t is the domestic-currency price of foreign currency.

(C) Higher domestic interest rates always lead to an immediate depreciation of the domestic currency.

(D) UIP holds exactly and continuously in all empirical data.

Q29. For a constrained **minimisation** problem $\min f(\mathbf{x})$ subject to $g_i(\mathbf{x}) \geq 0$, the **KKT conditions** include:

(A) $\dfrac{\partial f}{\partial x_j} = \sum_i \lambda_i \dfrac{\partial g_i}{\partial x_j}$ for all j, where $\lambda_i \geq 0$ and complementary slackness $\lambda_i g_i(\mathbf{x}^*) = 0$ holds for each i.

(B) The Lagrange multipliers must be strictly positive for all active constraints.

(C) If the objective function is concave, any local minimum is a global minimum.

(D) The KKT conditions for minimisation are identical in sign to those for maximisation.

Q30. Which statement correctly describes the **limitations of the Green Revolution** in India?

(A) The Green Revolution led to an overall decline in food grain production in India.

(B) All Indian states benefited equally from the Green Revolution.

(C) The Green Revolution was primarily driven by the use of traditional seed varieties.

(D) The Green Revolution increased inter-regional inequalities between irrigated and rain-fed regions, depleted groundwater, raised dependence on chemical inputs, and largely bypassed pulses, oilseeds, and coarse cereals — resulting in nutritional imbalances.

Section B — Multiple Select Questions (MSQ)

- **Q31–Q40:** 2 marks each. No negative marking. Full marks only if **all** correct options are selected.

Q31. [MSQ — one or more options may be correct.] Which of the following statements comparing **monopoly with perfect competition** are **correct**?

(A) A monopolist produces more output than a competitive industry facing the same demand and costs.

(B) Producer surplus under monopoly is typically higher than under perfect competition, since the monopolist restricts output and raises price above marginal cost.

(C) A competitive market equilibrium maximises total surplus (consumer plus producer) for a given demand and cost structure, consistent with the First Welfare Theorem.

(D) Monopoly deadweight loss arises because the monopolist produces zero output.

Q32. [MSQ — one or more options may be correct.] Which of the following statements about **mixed strategy Nash equilibria** are **correct**?

(A) In a mixed strategy Nash equilibrium, each player is indifferent among the strategies they mix over, given the mixing probabilities of other players.

(B) Mixed strategy Nash equilibria do not exist in finite strategic-form games.

(C) Players randomise in a mixed NE because they want to surprise their opponents strategically.

(D) Every finite game has at least one Nash equilibrium, possibly in mixed strategies (Nash, 1950).

Q33. [MSQ — one or more options may be correct.] Which of the following are recognised **channels of monetary policy transmission**?

(A) The **interest rate channel**: a reduction in the policy rate lowers bank lending rates, reducing borrowing costs and stimulating investment and consumption.

(B) The **asset price channel**: lower interest rates raise bond and equity prices, increasing household wealth (wealth effect) and Tobin's q, thereby boosting investment.

(C) The monetary transmission mechanism works identically in all economies regardless of financial sector development or depth.

(D) The **exchange rate channel**: lower interest rates lead to currency depreciation, improving the competitiveness of exports.

Q34. [MSQ — one or more options may be correct.] Which of the following statements about **comparative statics in supply and demand** are **correct**?

(A) An increase in the price of a complementary good causes the demand curve for the good in question to shift leftward.

(B) A rise in the market wage rate shifts the labour demand curve rightward.

(C) A technological improvement that reduces production costs shifts the supply curve rightward, lowering the equilibrium price.

(D) An increase in consumer income always shifts the demand for every good rightward.

Q35. [MSQ — one or more options may be correct.] Which of the following statements about **perfect (first-degree) price discrimination** are **correct**?

(A) Perfect price discrimination results in lower output than a uniform-price monopolist.

(B) Under perfect price discrimination, the entire consumer surplus is transferred to the producer — no consumer surplus remains.

(C) Perfect price discrimination eliminates the deadweight welfare loss of monopoly, achieving allocative efficiency.

(D) Perfect price discrimination requires grouping consumers into identifiable market segments.

Q36. [MSQ — one or more options may be correct.] Which of the following statements about **public goods and the free-rider problem** are **correct**?

(A) A pure public good is **non-rival** in consumption: one person's enjoyment does not diminish its availability to others.

(B) Pure public goods are efficiently provided by competitive markets without any government intervention.

(C) The **free-rider problem** leads to under-provision of public goods in decentralised markets because individuals consume the good without paying.

(D) **Lindahl pricing** — where each consumer pays a personalised price equal to their marginal benefit — is a theoretical mechanism that achieves efficient provision of public goods.

Q37. [MSQ — one or more options may be correct.] Which of the following statements about the consequences of **serial (auto)correlation** on OLS estimation are **correct**?

(A) Serial correlation causes the OLS estimates to become biased.

(B) Serial correlation causes the OLS estimates to become inconsistent.

(C) Under serial correlation, OLS standard errors are typically underestimated, inflating t-statistics and leading to spurious rejection of H_0.

(D) Generalised Least Squares (GLS) is more efficient than OLS in the presence of serial correlation.

Q38. [MSQ — one or more options may be correct.] Which of the following statements about **rational expectations** and macroeconomic policy are **correct**?

(A) Under rational expectations, agents use all available public information to form forecasts; their expectations equal the mathematical conditional expectation of the variable given available information.

(B) The **policy ineffectiveness proposition** (Sargent-Wallace) holds that only *unanticipated* monetary policy can affect real output under rational expectations with flexible prices.

(C) Rational expectations implies that every agent has an identical information set and makes no forecast errors of any kind.

(D) Under rational expectations, systematic countercyclical fiscal policy can permanently raise real output above potential.

Q39. [MSQ — one or more options may be correct.] Which of the following statements about the **WTO and India's trade policy** are **correct**?

(A) India is not a member of the WTO.

(B) Under the WTO's GATT framework, the **Most Favoured Nation (MFN)** clause requires that any trade concession granted to one WTO member must be extended to all other WTO members.

(C) India's WTO membership requires it to eliminate all import duties immediately.

(D) The WTO's **TRIPS agreement** requires India to provide minimum international standards of patent and copyright protection.

Q40. [MSQ — one or more options may be correct.] Which of the following statements comparing the **Solow model** with **endogenous growth models** are **correct**?

(A) In the Solow model, without exogenous technological progress, per-capita output converges to a constant steady-state level — long-run per-capita growth requires exogenous TFP growth.

(B) Both the Solow model and the AK endogenous growth model predict conditional convergence of per-capita income across countries.

(C) Endogenous growth models (such as the AK model) can generate sustained long-run per-capita growth even without exogenous technological change.

(D) In both the Solow model and the AK model, a permanently higher savings rate raises the long-run per-capita growth rate.

Section C — Numerical Answer Type (NAT)

- **Q41–Q50:** 1 mark each; **Q51–Q60:** 2 marks each. No negative marking.

Q41. A consumer has utility function $U(x, y) = x^{2/3}\, y^{1/3}$ and faces prices $p_x = 4$, $p_y = 3$ with income $M = 36$. The utility-maximising demand for good x is _____.

Q42. A competitive industry has total cost function $TC = \frac{1}{2}q^2 + 2q + 8$ for each identical firm. In the **long-run competitive equilibrium**, the market price equals _____.

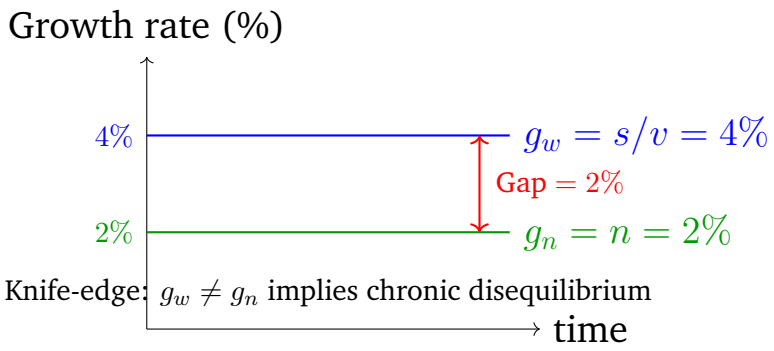
Q43. In a simple Keynesian model, autonomous expenditure is $A = 180$ and the marginal propensity to consume is $MPC = 0.8$. The equilibrium income Y^* equals _____.

Q44. Let X and Y be **independent** random variables with $E[X] = 4$ and $E[Y] = 3$. Then $E[XY]$ equals _____.

Q45. Let $A = \begin{pmatrix} 3 & 1 \\ 5 & 2 \end{pmatrix}$. The $(2, 1)$ element of A^{-1} equals _____.

Q46. A consumer maximises $U(x, y) = x^{1/2}\, y^{1/2}$ subject to $4x + y = 20$ (with $p_x = 4$, $p_y = 1$, income $M = 20$). The maximum utility U^* equals _____.

Q47. In the Harrod-Domar model, the savings rate is $s = 0.12$ and the capital-output ratio is $v = 3$, giving a warranted growth rate $g_w = 4\%$. If the natural growth rate (labour force growth) is $n = 2\%$, the **knife-edge gap** $(g_w - g_n)$ in percentage points equals _____.



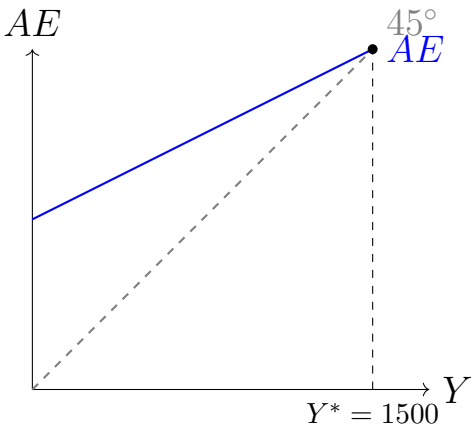
Q48. In a simple linear regression with $n = 12$ observations and one explanatory variable, the sum of squared residuals $SSE = 40$. The **standard error of the regression** $\hat{\sigma} = \sqrt{SSE/(n-2)}$ equals _____.

Q49. Three identical firms compete in **Cournot** fashion. Market inverse demand is $P = 80 - Q$ and each firm has constant marginal cost $MC = 20$ with no fixed costs. Each firm's equilibrium **profit** equals _____.

Q50. A country's export price index is 120 and its import price index is 100 (base year $= 100$). The **terms of trade index** $\left(\dfrac{\text{Export price index}}{\text{Import price index}} \times 100\right)$ equals _____.

Q51. An investment pays Rs. 100 at the end of every year forever. At an annual interest rate of 5%, the **present value** of this perpetuity equals Rs. _____.

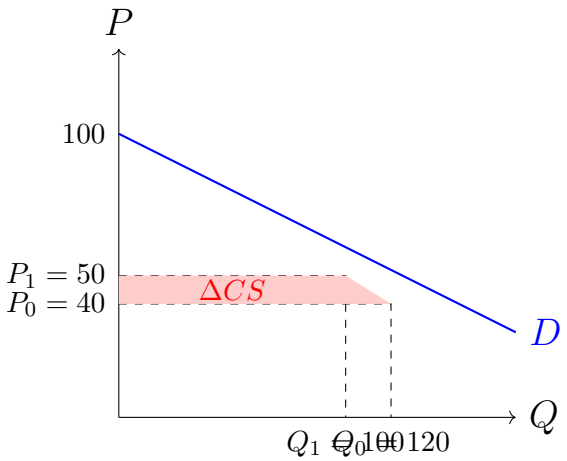
Q52. In a Keynesian open economy model, consumption is $C = 100 + 0.6Y$, investment is $I = 200$, government expenditure is $G = 300$, exports are $X = 150$, and imports are $M = 0.1Y$. The equilibrium income Y^* equals _____.



Q53. The sum of the infinite geometric series $1 + 0.9 + 0.81 + 0.729 + \cdots$ equals _____.

Q54. Let $A = \begin{pmatrix} 2 & 1 \\ 0 & 3 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 0 \\ 2 & 1 \end{pmatrix}$. The $(1,1)$ element of the matrix product AB equals _____.

Q55. Market demand is $P = 100 - 0.5Q$. Price rises from $P_0 = 40$ to $P_1 = 50$. The **decrease in consumer surplus** equals _____.



Q56. A household's consumption basket consists of 2 units of good X and 3 units of good Y. In the base year, $P_X = 10$ and $P_Y = 20$. In the current year, $P_X = 12$ and $P_Y = 22$. The **Consumer Price Index (CPI)** for the current year (base year = 100) equals _____.

Q57. In a linear regression, the total sum of squares is $SST = 200$ and the regression (explained) sum of squares is $SSR = 128$. The coefficient of determination R^2 equals _____.

Q58. A principal of Rs. $2{,}000$ is invested at an annual interest rate of 10%, compounded annually. The **future value** after 3 years equals Rs. _____.

Q59. A monopolistically competitive firm has total cost $TC = 10Q + 100$ and faces demand $P = 30 - Q$ in the short run. In the **long-run competitive equilibrium** (where $P = AC$ and $MR = MC$), the firm's output equals _____.

Q60. In a four-person economy, the incomes are 0, 0, 0, and 100 (in Rs. thousand). The **Gini coefficient** of income inequality equals _____.

Detailed Solutions

Solution

Concept — Roy's Identity $\|Chapter: Microeconomics---ConsumerTheory:$ $Roy'sidentitylinksthe\textbf{indirect}utilityfunction\textbf{V(p,I)}to the\textbf{Marshallian}demand.Differentiatingt$ $\equiv U(x)$ **with respect to** p_i **and applying the chain rule yields:**

$$x_i(p, I) = -\frac{\partial V/\partial p_i}{\partial V/\partial I}.$$

Intuitively, the numerator measures how much utility falls when p_i **rises (negative), and the denominator is the marginal utility of income (positive), so the ratio is negative; the extra minus sign makes** x_i **positive.**

Step 1 — Verification:
By the envelope theorem, $\partial V/\partial p_i = -\lambda x_i$ **and** $\partial V/\partial I = \lambda$ **(where** λ **is the Lagrange multiplier). Hence:**

$$-\frac{\partial V/\partial p_i}{\partial V/\partial I} = \frac{\lambda x_i}{\lambda} = x_i. \quad \checkmark$$

Why other options are wrong:

Sol.1.

- **Option A:** $\partial V/\partial p_i < 0$**, so this gives a negative demand — incorrect.**
- **Option B: The product** $(\partial V/\partial p_i)(\partial V/\partial I)$ **has wrong units and sign structure — not demand.**
- **Option D: The ratio is inverted relative to the correct formula; this would give** $-1/x_i$**, not** x_i**.**

Final Answer: $x_i = -(\partial V/\partial p_i)/(\partial V/\partial I) \Rightarrow$ **(C)**

Answer: (C) ↪ Go Back to Q#1

Answer: (D) ↪ Go Back to Q#2

Solution

Concept — Central Limit Theorem (CLT) $\|Chapter: Statistics\&Probability:$ $TheCLTisoneofthemostfundamentalresultsinprobabilitytheory.Itstatesthatforindependent,identico$ **with finite mean** μ **and finite variance** σ^2**, the standardised sample mean converges**

in distribution to the standard normal:

$$Z_n = \frac{\sqrt{n}\,(\bar{X}_n - \mu)}{\sigma} \xrightarrow{d} N(0,1) \quad \textbf{as } n \to \infty.$$

No assumption about the shape of the parent distribution is required beyond finite mean and variance.

Step 1 — Key points:

- **The convergence is in *distribution*, not almost surely.**
- **For finite n, the exact distribution of $\bar{X}_n$ need not be normal (unless the population is normal).**
- **The result holds even for skewed or heavy-tailed distributions (provided finite σ^2).**

Why other options are wrong:

- **Option B: $\bar{X}_n$ is *exactly* normal only when the parent distribution is normal; the CLT gives asymptotic normality.**
- **Option C: The CLT applies to *any* distribution with finite variance, not just normal populations.**
- **Option D: Under standard conditions, the sample mean and sample median both converge to normality, but the mean converges faster (has lower asymptotic variance for symmetric distributions).**

Final Answer: $\sqrt{n}(\bar{X}_n - \mu)/\sigma \xrightarrow{d} N(0,1) \Rightarrow$ **(A)**

Answer: (A) ↪ Go Back to Q#3

Answer: (B) ↪ Go Back to Q#4

Answer: (D) ↪ Go Back to Q#5

Solution

Concept — Open-Economy Government Expenditure Multiplier $\|Chapter : Macroeconomics - - - OpenEconomy :$

$Inaclosedeconomywithnogovernment : multiplier$**= 1/(1-c)**.

In an open economy with government (MPC $= c$, marginal tax rate $= t$, marginal propensity to import $= m$):

$$\textbf{Multiplier} = \frac{1}{1 - c(1-t) + m}.$$

Since $c(1-t) < c$ (the tax reduces disposable income) and $m > 0$ (imports are a further leakage):

$$1 - c(1-t) + m > 1 - c \implies \frac{1}{1-c(1-t)+m} < \frac{1}{1-c}.$$

Hence the open-economy multiplier is *smaller*.

Step 1 — Numerical example:
Let $c = 0.8$, $t = 0.2$, $m = 0.1$:

$$\textbf{Closed}: \frac{1}{1-0.8} = 5; \quad \textbf{Open}: \frac{1}{1-0.8(0.8)+0.1} = \frac{1}{1-0.64+0.1} = \frac{1}{0.46} \approx 2.17.$$

The open-economy multiplier is much smaller.

Why other options are wrong:

- **Option B: Government spending boosts incomes, but the *multiplier* is smaller, not larger, due to tax and import leakages.**
- **Option C: $1/(1-c)$ is the closed-economy multiplier without government or trade.**
- **Option D: A multiplier of 1 would require $c(1-t) = m$, which is not generally true.**

Final Answer: Open-economy multiplier $<$ closed-economy multiplier due to leakages $\Rightarrow$ (A)

Answer: (A) ↪ Go Back to Q#6

Answer: (B) ↪ Go Back to Q#7

Solution

Concept — Student's t-Distribution $\|Chapter: Statistics \& Probability:$

The**t(k)**$distributionissymmetricandbell-shapedlike$**N(0,1)**$, butwith$***heavier tails***$.Itsvarianceis$**k/(k-2)**$fork > 2, whichexceeds$**1**$(thevarianceof$**N(0,1)**$).Ask \to \infty$**:**

$$t(k) \xrightarrow{d} N(0,1).$$

Heavier tails mean critical values from the t-table are larger than z-values for finite samples, making hypothesis tests more conservative.

Step 1 — Key properties summary:

- **Mean: 0 (for $k > 1$); Variance: $k/(k-2)$ (for $k > 2$) > 1.**
- **Symmetric about 0; unimodal; heavier tails than $N(0,1)$.**

- $t(1)$ = **Cauchy distribution (no finite mean or variance).**

Why other options are wrong:

- **Option A:** $\text{Var}[t(k)] = k/(k-2) > 1$ **for all finite** $k > 2$ **— larger variance, not smaller.**
- **Option B:** $t(k)$ **converges to** $N(0,1)$**, not the chi-square distribution, as** $k \to \infty$**.**
- **Option D: The** t**-distribution is defined for any positive integer** $k \geq 1$**; there is no restriction to** $k \geq 30$**.**

Final Answer: $t(k)$ **has heavier tails than** $N(0,1)$**;** $t(k) \to N(0,1)$ **as** $k \to \infty \Rightarrow$ **(C)**

Answer: (C) ↪ Go Back to Q#8

Answer: (A) ↪ Go Back to Q#9

Solution

Concept — Human Poverty Index (HPI-1) vs HDI $\|Chapter: IndianEconomy---Poverty\&Inequality:$

HDI$(HumanDevelopmentIndex)measures$***average achievements***$acrossthreedimensions:longevity(lifeexpectancy), knowledge(education), andlivingstandard(GNIpercapita).Itiscomputedfor$

HPI-1 (for developing countries) measures *deprivations* in three analogous dimensions:

1. **Longevity:** P_1 **= probability at birth of not surviving to age 40.**
2. **Knowledge:** P_2 **= adult illiteracy rate.**
3. **Living standards:** P_3 **= average of (i) % without access to safe water, (ii) % without access to health services, (iii) % of underweight children under 5.**

$HPI\text{-}1 = \left[\frac{1}{3}(P_1^3 + P_2^3 + P_3^3)\right]^{1/3}$.

Why other options are wrong:

- **Option A: Measuring average achievements is the role of the *HDI*, not HPI-1.**
- **Option B: HPI-1 does not use income per capita; it uses deprivation indicators for longevity, literacy, and basic living standards.**
- **Option C: The HDI is computed for the whole population, not only for the poor; HPI-1 measures the fraction of the population that is deprived.**

Final Answer: HPI-1 measures deprivations; HDI measures achievements ⇒ (D)

Answer: (D) ↪ Go Back to Q#10

Answer: (B) ↪ Go Back to Q#11

Solution

Concept — Bertrand Paradox and Product Differentiation $\|Chapter : Microeconomics - - - MarketStructure :$

The**Bertrand paradox** : $withtwofirms, identicalproducts, andconstantmarginalcosts, Bertrandpriced$ **= MC**$(competitiveoutcome)evenwithonlytwofirms.Eachfirmundercutstheotheruntilnofurtherunder$

Resolution via product differentiation: When goods are differentiated, each firm faces a *downward-sloping* residual demand. Undercutting by ϵ does not capture all market demand (consumers have brand loyalty or switching costs). Reaction functions in price space slope upward, and the Nash equilibrium has $P > MC$ for both firms — profit is positive.

Step 1 — Bertrand reaction functions (differentiated):
Let $P_i = a - bQ_i + dQ_j$ be firm i's inverse demand. The Nash equilibrium price p^* satisfies:

$$p^* = \frac{a+c}{2-d/b} > c = MC \quad \textbf{for } d < 2b.$$

Why other options are wrong:

- **Option B: Collusion resolves the paradox by raising prices, but the question asks what *resolves* the paradox structurally within non-cooperative competition.**
- **Option C: Adding more firms maintains $P = MC$ if goods remain homogeneous; the paradox persists regardless of the number of firms.**
- **Option D: Zero fixed costs are already assumed in the standard Bertrand paradox; reducing FC further does not resolve it.**

Final Answer: Product differentiation gives pricing power; NE has $P > MC \Rightarrow$ (A)

Answer: (A) ↪ Go Back to Q#12

Solution

Concept — Mundell-Fleming: Fixed Exchange Rate, Perfect Capital Mobility $\|Chapter : Macroeconomics - - - InternationalFinance :$

$Underperfectcapitalmobility, theBPcurveis$**horizontal**$attheworldinterestrate$**r***. **With a fixed exchange rate:**

- **Fiscal expansion ($\uparrow G$): IS shifts right $\rightarrow$ incipient $r > r^*$ $\rightarrow$ capital inflows $\rightarrow$ upward pressure on currency $\rightarrow$ central bank sells domestic currency (buys foreign) to maintain peg $\rightarrow$ money supply expands $\rightarrow$ LM shifts right $\rightarrow$ output rises fully. Full multiplier, no crowding out.**
- **Monetary expansion: LM shifts right $\rightarrow$ incipient $r < r^*$ $\rightarrow$ capital outflows $\rightarrow$ downward pressure on currency $\rightarrow$ central bank buys domestic currency $\rightarrow$**

money supply contracts → LM shifts back. Monetary policy is ineffective (fixed rate).

Why other options are wrong:

- **Option A: Under a fixed exchange rate, fiscal expansion is effective (full multiplier); it is under a *flexible* exchange rate that crowding-out of net exports occurs.**
- **Option B: Monetary expansion is sterilised by the exchange-rate commitment — it is ineffective, not permanently expansionary.**
- **Option C: The BP curve is *horizontal* under perfect capital mobility, not upward-sloping.**

Final Answer: Fixed rate + perfect capital mobility ⇒ fiscal policy highly effective ⇒ (D)

Answer: (D) ↪ Go Back to Q#13

Answer: (C) ↪ Go Back to Q#14

Solution

Concept — Durbin-Watson (DW) Statistic $||Chapter: Statistics\&Econometrics: The DW statistic tests for first-order autocorrelation \rho$ **in OLS residuals** $\hat{\varepsilon}_t$**:**

$$DW = \frac{\sum_{t=2}^{T}(\hat{\varepsilon}_t - \hat{\varepsilon}_{t-1})^2}{\sum_{t=1}^{T}\hat{\varepsilon}_t^2} \approx 2(1-\hat{\rho}).$$

- $DW \approx 2$**:** $\hat{\rho} \approx 0$ **— no autocorrelation.**
- $DW \approx 0$**:** $\hat{\rho} \approx 1$ **— strong positive autocorrelation.**
- $DW \approx 4$**:** $\hat{\rho} \approx -1$ **— strong negative autocorrelation.**
- **Range:** $0 \leq DW \leq 4$**.**

Why other options are wrong:

- **Option A: The DW test is *invalid* when lagged dependent variables appear as regressors (Durbin's h-test should be used instead).**
- **Option C: DW ranges from 0 to 4, not from -1 to 1 (that range describes $\hat{\rho}$).**
- **Option D: $DW \approx 0$ indicates *positive* autocorrelation ($\hat{\rho} \approx 1$); negative autocorrelation gives $DW \approx 4$.**

Final Answer: $DW \approx 2$ ⇒ no first-order serial correlation ⇒ (B)

Answer: (B) ↪ Go Back to Q#15

Solution

Concept — Second-Order Conditions for Constrained Optimisation $\|Chapter : Mathematics - - - Optimization :$

$For \max f(x,y)$ **subject to** $g(x,y) = 0$**, the Lagrangian is** $\mathcal{L} = f(x,y) - \lambda g(x,y)$**. The bordered Hessian is:**

$$\bar{H} = \begin{vmatrix} 0 & g_x & g_y \\ g_x & \mathcal{L}_{xx} & \mathcal{L}_{xy} \\ g_y & \mathcal{L}_{yx} & \mathcal{L}_{yy} \end{vmatrix}.$$

The second-order *sufficient* condition for a constrained maximum is $\det(\bar{H}) > 0$**.**

Step 1 — Intuition:
The bordered Hessian incorporates the constraint structure. Unlike the unconstrained case, negative definiteness of the unrestricted Hessian of f is neither necessary nor sufficient for a constrained maximum.

Why other options are wrong:

- **Option A: Negative definiteness of the unrestricted Hessian of f ensures an unconstrained maximum, not necessarily a constrained one; with binding constraints, the relevant curvature is restricted to the constraint manifold.**
- **Option B: Linear f cannot have a maximum on a bounded constraint set at an interior point in general; the maximum would be at a corner — not the typical interior SOC result.**
- **Option D: If the constraint is non-binding, we have an unconstrained interior maximum, which requires a different (unconstrained) SOC.**

Final Answer: Positive bordered Hessian determinant $\Rightarrow$ constrained maximum $\Rightarrow$ (C)

Answer: (C) ↪ Go Back to Q#16

Answer: (A) ↪ Go Back to Q#17

Answer: (D) ↪ Go Back to Q#18

Answer: (B) ↪ Go Back to Q#19

Solution

Concept — Saddle Point of a 2D Linear System $\|Chapter : Mathematics - - - Differential Equations :$

$For the system$ **Ax**$, the equilibrium$ **x = 0** $is a$ **saddle point** $when \det(A) < 0$**, which oc-**

curs if and only if A has one positive and one negative real eigenvalue $(\lambda_1 < 0 < \lambda_2)$.

Step 1 — Phase portrait:

- *Stable manifold*: trajectories associated with $\lambda_1 < 0$ converge to the origin.
- *Unstable manifold*: trajectories associated with $\lambda_2 > 0$ diverge from the origin.
- The saddle point is unstable — generic trajectories diverge.

Step 2 — Determinant criterion:

$$\det(A) = \lambda_1\lambda_2 < 0 \iff \text{opposite-sign eigenvalues} \iff \text{saddle point}.$$

Why other options are wrong:

- Option A: Both eigenvalues negative $\Rightarrow$ stable node (all trajectories converge).
- Option B: Both eigenvalues positive $\Rightarrow$ unstable node (all trajectories diverge).
- Option D: Complex conjugates with positive real part $\Rightarrow$ unstable spiral (trajectories spiral outward).

Final Answer: Opposite-sign real eigenvalues ($\det(A) < 0$) $\Rightarrow$ saddle point $\Rightarrow$ (C)

Answer: (C) ↪ Go Back to Q#20

Solution

Concept — Revelation Principle $\|Chapter : Microeconomics - - - GameTheory :$

The**Revelation Principle**$(Myerson, 1979; Dasguptaetal., 1979)isacornerstoneofmechanismdesign.Its$

For any mechanism $\mathcal{M}$ and any Bayesian Nash equilibrium σ^* of $\mathcal{M}$, there exists an equivalent direct revelation mechanism $\hat{\mathcal{M}}$ (where each agent i simply reports type $\hat{\theta}_i$) such that:

1. ***Truthful reporting $\hat{\theta}_i = \theta_i$ is a BNE of $\hat{\mathcal{M}}$.***
2. ***The outcome (allocation and payments) in $\hat{\mathcal{M}}$ under truthful reporting equals the outcome of $\mathcal{M}$ under σ^*.***

Implication: Without loss of generality, the designer can restrict attention to *incentive-compatible direct mechanisms*. This vastly simplifies the mechanism design problem.

Why other options are wrong:

- Option B: Truthful reporting is a BNE (not necessarily a dominant strategy) in the equivalent direct mechanism; dominant-strategy truthfulness requires addi-

tional structure (strategy-proof mechanisms).

- Option C: The revelation principle shows truthful mechanisms *replicate* equilibrium outcomes; it does not say the optimum requires lying.
- Option D: Other mechanism forms (sealed-bid auctions, VCG mechanisms) can also achieve incentive compatibility; direct mechanisms are one representation, not the only one.

Final Answer: Any BNE of any mechanism ⇒ equivalent incentive-compatible direct mechanism ⇒ (A)

Answer: (A) ↪ Go Back to Q#21

Answer: (D) ↪ Go Back to Q#22

Solution

Concept — Fisher Information for Bernoulli(p) $\|Chapter : Statistics\&Econometrics : For$**X** $\sim \text{Bernoulli}(p)$**, the log-likelihood for a single observation** $x \in \{0,1\}$ **is:**

$$\ell(p;x) = x\log p + (1-x)\log(1-p).$$

Step 1 — Score function:

$$\frac{\partial \ell}{\partial p} = \frac{x}{p} - \frac{1-x}{1-p}.$$

Step 2 — Fisher information:

$$I(p) = E\left[\left(\frac{\partial \ell}{\partial p}\right)^2\right] = \text{Var}\left(\frac{\partial \ell}{\partial p}\right).$$

Since $E[x] = p$**,** $E[x^2] = p$**:**

$$E\left[\left(\frac{x}{p} - \frac{1-x}{1-p}\right)^2\right] = \frac{E[x^2]}{p^2} - 2\cdot\frac{E[x(1-x)]}{p(1-p)} + \frac{E[(1-x)^2]}{(1-p)^2}.$$

Note $x(1-x) = 0$ **always for** $x \in \{0,1\}$**, so:**

$$= \frac{p}{p^2} + \frac{1-p}{(1-p)^2} = \frac{1}{p} + \frac{1}{1-p} = \frac{1}{p(1-p)}.$$

Alternatively (second-derivative method): $I(p) = -E[\partial^2\ell/\partial p^2] = 1/[p(1-p)]$**.**

Why other options are wrong:

- **Option A ($p(1-p)$): This is $\mathrm{Var}(X)$, not the Fisher information.**
- **Option B: $\log[p/(1-p)]$ is the log-odds (logit transform), unrelated to Fisher information.**
- **Option D ($p^2(1-p)$): Has no standard interpretation in this context.**

Final Answer: $I(p) = 1/[p(1-p)] \Rightarrow$ **(C)**

Answer: (C) ↪ Go Back to Q#23

Solution

Concept — Nilpotent Matrices $\|Chapter : Mathematics - - - Linear Algebra :$ $Amatrix\mathbf{A}isnilpotentif\mathbf{A}^k = 0$ **for some positive integer** k**. For an** $n \times n$ **nilpotent matrix,** $k \leq n$ **(by Cayley-Hamilton). The eigenvalues of a nilpotent matrix are all** 0 **(since if** $Av = \lambda v$ **then** $A^k v = \lambda^k v = 0 \Rightarrow \lambda = 0$**).**

For 2×2 **nilpotent matrices:**
All eigenvalues are 0**, so** $\det(A) = 0$ **and** $\mathrm{tr}(A) = 0$**. Furthermore** $A^2 = 0$ **(since** $k \leq 2$**).**

Example: $A = \begin{pmatrix} 0 & 1 \\ 0 & 0 \end{pmatrix}$**:** $A^2 = 0$**, eigenvalues both** 0**.**

Step 1 — Verification of option B:
$A^k = 0 \iff$ **all eigenvalues are** 0 **(by Cayley-Hamilton and spectral mapping theorem). For** 2×2**: characteristic polynomial is** $\lambda^2 - \mathrm{tr}(A)\lambda + \det(A) = \lambda^2$ **iff** $\mathrm{tr}(A) = 0$ **and** $\det(A) = 0$**. Then** $A^2 = 0$**.** ✓

Why other options are wrong:

- **Option A:** $\det(A) = 0$ **and** $\mathrm{tr}(A) \neq 0$ **would mean one eigenvalue is** 0 **and one is non-zero — not nilpotent.**
- **Option C: Two distinct negative eigenvalues imply** $A^k \neq 0$ **for all** k **(powers of negative numbers oscillate but stay non-zero).**
- **Option D: Symmetric with zero diagonal does not imply nilpotency (e.g.,** $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$ **has eigenvalues** ± 1**).**

Final Answer: Nilpotent $\iff A^k = 0$ **for some** k**, all eigenvalues zero** $\Rightarrow$ **(B)**

Answer: (B) ↪ Go Back to Q#24

Answer: (A) ↪ Go Back to Q#25

Solution

Concept — WPI vs CPI in India $\|Chapter : Indian Economy :$

Feature	WPI	CPI
Stage of pricing	Wholesale/producer	Retail/consumer
Coverage	Traded goods: primary, fuel, manufacturing	Goods + services consumed
Services	Not included	Included (large weight)
Food weight	Moderate	High (45–50% in CPI-Rural)
Base year (recent)	2011-12	2012
Use	Industrial inflation, monetary policy signal	Official inflation target (RBI)

Why other options are wrong:

- **Option A: WPI measures wholesale, not retail prices — retail prices are captured by CPI.**
- **Option B: CPI *includes* food (with large weight) and fuel; these are explicitly part of the CPI basket.**
- **Option C: WPI and CPI have very different commodity baskets and weights; they are not identical.**

Final Answer: WPI = wholesale/producer prices (goods); CPI = retail prices (goods + services, high food weight) $\Rightarrow$ (D)

Answer: (D) ↪ Go Back to Q#26

Answer: (C) ↪ Go Back to Q#27

Answer: (B) ↪ Go Back to Q#28

Solution

Concept — KKT Conditions for Constrained Minimisation $||Chapter: Mathematics---Optimization:$

For**min** $f(\mathbf{x})$ **subject to** $g_i(\mathbf{x}) \geq 0$ **(**$i = 1, \ldots, m$**), the Lagrangian is:**

$$\mathcal{L} = f(\mathbf{x}) - \sum_i \lambda_i g_i(\mathbf{x}).$$

KKT necessary conditions at $\mathbf{x}^*$**:**

1. **Stationarity:** $\partial f/\partial x_j = \sum_i \lambda_i (\partial g_i/\partial x_j)$ **for all** j**.**
2. **Primal feasibility:** $g_i(\mathbf{x}^*) \geq 0$**.**
3. **Dual feasibility:** $\lambda_i \geq 0$**.**
4. **Complementary slackness:** $\lambda_i g_i(\mathbf{x}^*) = 0$**.**

Note on signs: For a *maximisation* problem $\max f$ **s.t.** $g_i \geq 0$**, stationarity gives** $\nabla f = \sum_i \lambda_i \nabla g_i$ **with** $\lambda_i \geq 0$**. The form in option A is the same (consistent convention).**

Why other options are wrong:

- **Option B:** $\lambda_i > 0$ **is required only for *active* constraints; for inactive constraints (**$g_i > 0$**), complementary slackness forces** $\lambda_i = 0$**.**
- **Option C: For minimisation, a *convex* objective function (not concave) ensures any local minimum is global.**
- **Option D: KKT conditions for minimisation have the *same sign structure* for** $\lambda_i \geq 0$ **as for maximisation (in the convention used here) — but the Lagrangian differs. If the convention** $\mathcal{L} = f - \lambda g$ **is used, the stationarity condition for min is** $\nabla f = \lambda \nabla g$ **with** $\lambda \geq 0$**, which is option A.**

Final Answer: Stationarity $\partial f/\partial x_j = \sum_i \lambda_i \partial g_i/\partial x_j$**,** $\lambda_i \geq 0$**, complementary slackness** $\Rightarrow$ **(A)**

Answer: (A) ↪ Go Back to Q#29

Answer: (D) ↪ Go Back to Q#30

Solution

Concept — Welfare Comparison: Monopoly vs Perfect Competition (MSQ) $\|Chapter : Microeconomics - - - MarketStructure :$

Option A — FALSE. A monopolist restricts output below the competitive level to raise price. In a competitive industry, $P = MC$ **and firms produce at the intersection of supply and demand; the monopolist produces where** $MR = MC < P$**. Hence monopoly output < competitive output.**

Option B — TRUE. In a competitive industry with free entry, long-run profit is driven to zero, so producer surplus equals zero in the long run. A monopolist earns positive producer surplus by restricting output and raising price above MC. Hence PS is higher under monopoly (at least in the short run and typically in the long run absent very high fixed costs).

Option C — TRUE. The First Welfare Theorem states that a competitive equilibrium (absent externalities, public goods, and information failures) is Pareto efficient, which is equivalent to maximising total surplus ($CS + PS$**) for given demand and cost structures.**

Option D — FALSE. The monopolist produces *positive* output (at $MR = MC > 0$**); it does not produce zero output. The deadweight loss triangle arises precisely because the monopolist produces *less* than the competitive quantity, not zero.**

Summary:

- **B: Monopoly PS $\geq$ competitive PS ✓**
- **C: Competitive equilibrium maximises total surplus ✓**

Final Answer: Options B and C are correct $\Rightarrow$ (BC)

Answer: (BC) ↪ Go Back to Q#31

Solution

Concept — Mixed Strategy Nash Equilibria (MSQ) $\|Chapter : Microeconomics - - - GameTheory :$

Option A — TRUE. In a mixed strategy NE, player i must be *indifferent* among all strategies in the support of her mixed strategy — otherwise she would not mix. Her mixing probabilities are chosen to make other players indifferent. This indifference condition characterises equilibrium mixing.

Option B — FALSE. Nash's (1950) theorem guarantees that every finite strategic-form game has at least one Nash equilibrium, which may be in mixed strategies. Mixed NE can and do exist in finite games.

Option C — FALSE. Players randomise not to surprise opponents but to make opponents indifferent (so that opponents have no incentive to deviate from their own mixing). Surprise is a colloquial description but is not the formal equilibrium rationale.

Option D — TRUE. Nash's existence theorem: every finite game (finite players, finite strategy sets) has at least one Nash equilibrium, possibly in mixed strategies.

Final Answer: Options A and D are correct $\Rightarrow$ (AD)

Answer: (AD) ↪ Go Back to Q#32

Solution

Concept — Monetary Policy Transmission Channels (MSQ) $\|Chapter : Macroeconomics - - - MonetaryTheory :$

Option A — TRUE (Interest Rate Channel). A reduction in the policy rate (e.g., repo rate) leads commercial banks to lower lending rates. This reduces the cost of borrowing for firms (investment) and households (consumption), stimulating aggregate demand. This is the classic Keynesian transmission channel.

Option B — TRUE (Asset Price Channel). Lower interest rates raise the present value of future cash flows, pushing up bond prices, equity valuations, and real estate values. The increase in wealth (ΔW) boosts consumption (wealth effect).

Higher equity prices raise Tobin's q (ratio of market value to replacement cost), incentivising more investment.

Option C — FALSE. The strength of monetary transmission depends critically on the depth and efficiency of the financial system. In economies with underdeveloped banking sectors (credit rationing, low financial inclusion), the interest rate channel is weak. Transmission is not identical across all economies.

Option D — TRUE (Exchange Rate Channel). Lower domestic interest rates reduce returns on domestic assets relative to foreign assets, triggering capital outflows and currency depreciation. A weaker exchange rate improves the price competitiveness of exports and makes imports more expensive, stimulating net exports and aggregate demand.

Final Answer: Options A, B, and D are correct $\Rightarrow$ (ABD)

Answer: (ABD) ↪ Go Back to Q#33

Solution

Concept — Comparative Statics in Supply and Demand (MSQ) $\|Chapter : Microeconomics - - - MarketStructure :$

Option A — TRUE. Complement goods are consumed together (e.g., cars and petrol). If the price of petrol rises, the demand for cars falls at every price — the demand curve for cars shifts *left*. Formally: $\partial Q_i^d / \partial P_j < 0$ for complements.

Option B — FALSE. A rise in the market wage rate is a movement in the *price* of labour. It causes a movement *along* the labour demand curve (reduces quantity of labour demanded), not a shift of the demand curve itself. The labour demand curve shifts rightward only if the marginal product of labour rises (e.g., due to capital accumulation or technology improvement).

Option C — TRUE. A productivity improvement lowers production costs, reducing the marginal cost at every output level. Firms are willing to supply more at every price $\Rightarrow$ supply curve shifts right. In equilibrium, this reduces the market price and increases equilibrium quantity.

Option D — FALSE. Higher income raises demand for *normal* goods (demand shifts right) but *reduces* demand for inferior goods (e.g., low-quality food, bus travel). The statement "every good" is incorrect because inferior goods have negative income elasticity.

Final Answer: Options A and C are correct $\Rightarrow$ (AC)

Answer: (AC) ↪ Go Back to Q#34

Solution

Concept — Perfect (First-Degree) Price Discrimination (MSQ) $\|Chapter : Microeconomics - - - MarketStructure :$

Option A — FALSE. Under perfect price discrimination, the monopolist charges each consumer their maximum willingness to pay. As a result, the demand curve itself becomes the marginal revenue curve (MR = P at every unit). The monopolist expands output until $P = MC$ — *more* output than the uniform-price monopolist (in fact, competitive-level output is achieved). Output is *higher*, not lower.

Option B — TRUE. Since each consumer pays exactly their willingness to pay, no consumer obtains any surplus above what they pay. All consumer surplus is captured by the seller as producer surplus (revenue). Consumer surplus = 0.

Option C — TRUE. Under perfect discrimination, $MR = P$ at every unit sold, so the efficiency condition $MR = MC$ becomes $P = MC$, the same as perfect competition. Output equals the competitive level, eliminating the deadweight loss triangle. Total welfare (now entirely producer surplus) equals the competitive total surplus.

Option D — FALSE. Grouping consumers into identifiable segments (such as students vs adults, or domestic vs foreign) is the hallmark of *third-degree* price discrimination. Perfect (first-degree) price discrimination requires knowing each individual consumer's exact willingness to pay — it is consumer-by-consumer pricing, not group-based pricing.

Final Answer: Options B and C are correct $\Rightarrow$ (BC)

Answer: (BC) ↪ Go Back to Q#35

Solution

Concept — Public Goods and Free-Rider Problem (MSQ) $\|Chapter : Microeconomics - - - PublicEconomics :$

Option A — TRUE. Non-rivalry is the defining characteristic of a pure public good. Unlike private goods where one person's consumption reduces the quantity available to others, a public good can be consumed simultaneously by many individuals without diminishing the amount available to each (e.g., national defence, lighthouses, broadcast television).

Option B — FALSE. Because pure public goods are non-excludable, private markets underprovide them. Rational consumers free-ride (consume without paying), so private suppliers cannot recover costs. The market provision is zero or below socially optimal. Government intervention (provision or subsidy) is typically re-

quired.

Option C — TRUE. The free-rider problem: since no one can be excluded from consuming the public good once provided, each individual has an incentive to let others pay for it. In the Nash equilibrium of voluntary contribution, the public good is under-provided relative to the social optimum (Samuelson condition: $\sum_i MRS_i = MRT$).

Option D — TRUE. Lindahl (1919) proposed personalised prices: each individual i is charged a price equal to their marginal benefit MB_i for the public good. The sum of Lindahl prices covers the marginal cost. At these prices, each individual voluntarily demands the same quantity, which is the socially efficient quantity. Though informationally demanding (requiring honest revelation of preferences), it is theoretically the efficient solution.

Final Answer: Options A, C, and D are correct ⇒ (ACD)

Answer: (ACD) ↪ Go Back to Q#36

Solution

Concept — Serial (Auto)Correlation: Consequences for OLS (MSQ) $\|Chapter : Statistics\&Econometrics :$

Option A — FALSE. Serial correlation violates the assumption $\text{Cov}(\varepsilon_t, \varepsilon_s) = 0$ for $t \neq s$, but does *not* violate $E[\varepsilon_t|X] = 0$. Since OLS unbiasedness requires only the zero-conditional-mean assumption (not uncorrelated errors), OLS remains *unbiased* under serial correlation.

Option B — FALSE. Consistency of OLS requires $E[\varepsilon_t|X_t] = 0$ (or a plim-version). Serial correlation in ε_t alone does not break this zero-mean condition, so OLS remains *consistent*. (Inconsistency arises when a lagged dependent variable is included alongside serially correlated errors.)

Option C — TRUE. The OLS variance formula $\hat{\text{Var}}(\hat{\beta}) = s^2(X'X)^{-1}$ assumes $E[\varepsilon\varepsilon'] = \sigma^2 I$. Under positive serial correlation, the true variance is larger, but the OLS formula produces an underestimate. This inflates t-statistics and F-statistics, leading to spurious rejections of H_0.

Option D — TRUE. The Gauss-Markov theorem requires $E[\varepsilon\varepsilon'] = \sigma^2 I$. When this fails (serial correlation), OLS is no longer the Best Linear Unbiased Estimator (BLUE). GLS, which uses the known autocorrelation structure to transform the model, achieves the Gauss-Markov minimum variance bound and is more efficient.

Final Answer: Options C and D are correct ⇒ (CD)

Answer: (CD) ↪ Go Back to Q#37

Solution

Concept — Rational Expectations and Policy Ineffectiveness (MSQ) $\|Chapter : Macroeconomics - - - MacroeconomicTheory :$

Option A — TRUE. The rational expectations hypothesis (Muth, 1961): $E_t^e[\cdot] = E[\cdot|\mathcal{I}_t]$, where $\mathcal{I}_t$ is the information set available at time t. Agents are assumed to know the true model of the economy and use it correctly. Their forecast errors $\varepsilon_{t+1} = y_{t+1} - E_t[y_{t+1}]$ are mean-zero and uncorrelated with $\mathcal{I}_t$ (white noise), but not necessarily zero.

Option B — TRUE. Sargent and Wallace (1975) showed that under rational expectations and flexible prices (wages/prices adjust instantly), only *unanticipated* monetary policy shocks can affect real output. Anticipated policy is immediately offset by price adjustments. This is the policy ineffectiveness proposition.

Option C — FALSE. Rational expectations does *not* require identical information sets; agents may have different information. More importantly, agents make forecast errors — the key is that these errors are *random and unforecastable* (white noise), not systematic. Agents can and do make mistakes, just not predictably.

Option D — FALSE. Under rational expectations (especially in the New Classical model), systematic policy — being anticipated — causes immediate price/wage adjustment, leaving real output unchanged. Only unanticipated shocks matter for output. Systematic countercyclical policy cannot permanently raise output above potential.

Final Answer: Options A and B are correct $\Rightarrow$ (AB)

Answer: (AB) ↪ Go Back to Q#38

Solution

Concept — WTO Membership and India's Obligations (MSQ) $\|Chapter : IndianEconomy - - - InternationalTrade :$

Option A — FALSE. India is a founding member of the WTO (1 January 1995), having been a contracting party to GATT since 1948. India actively participates in WTO negotiations and disputes.

Option B — TRUE. The Most Favoured Nation (MFN) principle is the cornerstone of the GATT/WTO system (GATT Article I). It requires any tariff concession or trade advantage granted to one WTO member to be extended *immediately and unconditionally* to all other WTO members. Exceptions exist for: free trade agreements

(FTAs), customs unions, and the Generalised System of Preferences (GSP) for developing countries.

Option C — FALSE. WTO membership does not require elimination of all tariffs. Countries maintain *bound tariff rates* (maximum committed tariff levels) negotiated during accession and trade rounds. Actual (applied) tariffs can be below bound rates but cannot exceed them. India retains substantial tariffs within its WTO bindings.

Option D — TRUE. The Agreement on Trade-Related Intellectual Property Rights (TRIPS), which came into force with the WTO in 1995, sets minimum standards for intellectual property protection. India was required to amend its Patents Act (amended in 2005 to comply with TRIPS) to grant product patents in pharmaceuticals and agrochemicals for 20 years, as required by TRIPS Article 27–28.

Final Answer: Options B and D are correct $\Rightarrow$ (BD)

Answer: (BD) ↪ Go Back to Q#39

Solution

Concept — Solow vs Endogenous Growth Models (MSQ) $\|Chapter : Macroeconomics - - - EconomicGrowth :$

Option A — TRUE. In the Solow model without exogenous TFP growth, the economy converges to a steady state where $\dot{k} = sf(k) - (n+\delta)k = 0$. At the steady state, per-capita output $y^* = f(k^*)$ is constant. Without technological progress ($g = 0$), the long-run per-capita growth rate is zero. Sustained per-capita growth requires exogenous TFP growth.

Option B — FALSE. The Solow model predicts *conditional* convergence (countries with similar structural parameters converge to the same steady state, but poorer countries grow faster). The AK model ($Y = AK$, or more general endogenous growth models) predicts *no convergence* — the growth rate $g = sA - \delta$ depends on the savings rate s, which varies across countries. Countries with higher s grow permanently faster and do not converge to a common income level.

Option C — TRUE. In the AK model $Y = AK$ (where K encompasses human and physical capital), the per-capita growth rate is:

$$g = \frac{\dot{k}}{k} = sA - \delta - n,$$

which is positive and sustained as long as $sA > \delta + n$, even without any exogenous technological change. This is the defining feature of endogenous growth: returns to (broadly defined) capital do not diminish.

Option D — FALSE. In the Solow model, a permanently higher savings rate raises the *level* of per-capita income (moves to a higher steady state) but does not permanently raise the *growth rate* (which returns to g_{TFP} in the long run). Only in the AK model does a higher s permanently raise the growth rate.

Final Answer: Options A and C are correct $\Rightarrow$ (AC)

Answer: (AC) ↪ Go Back to Q#40

Solution

Concept — Cobb-Douglas Utility Maximisation $\|Chapter : Microeconomics - - - ConsumerTheory :$

For**U = x$^{\alpha}y^{\beta}$ with budget $p_x x + p_y y = M$, the Marshallian demands are:**

$$x^* = \frac{\alpha}{\alpha+\beta}\cdot\frac{M}{p_x}, \qquad y^* = \frac{\beta}{\alpha+\beta}\cdot\frac{M}{p_y}.$$

Step 1 — Identify parameters:
$U = x^{2/3}y^{1/3}$, **so** $\alpha = 2/3$, $\beta = 1/3$, $\alpha+\beta = 1$. **Given** $p_x = 4$, $p_y = 3$, $M = 36$.

Step 2 — Compute x^*:

$$x^* = \frac{2/3}{1}\cdot\frac{36}{4} = \frac{2}{3}\times 9 = 6.$$

Step 3 — Verify (compute y^*):

$$y^* = \frac{1/3}{1}\cdot\frac{36}{3} = \frac{1}{3}\times 12 = 4.$$

Budget check: $4(6)+3(4) = 24+12 = 36$. ✓

Final Answer: Optimal demand for x = $\boxed{6}$

Answer: (6) ↪ Go Back to Q#41

Solution

Concept — Long-Run Competitive Equilibrium Price $\|Chapter : Microeconomics - - - MarketStructure :$

$Inthelong-runcompetitiveequilibrium, freeentryandexitdriveeconomicprofittozero.Thisoccursatthe$**= $\min AC$, and simultaneously $MC = AC$ (the minimum-AC condition).**

Step 1 — Compute AC and MC:

$$TC = \tfrac{1}{2}q^2 + 2q + 8 \implies AC = \frac{q}{2} + 2 + \frac{8}{q}, \quad MC = q + 2.$$

Step 2 — Minimise AC (set $dAC/dq = 0$):

$$\frac{d(AC)}{dq} = \frac{1}{2} - \frac{8}{q^2} = 0 \implies q^2 = 16 \implies q^* = 4.$$

Step 3 — Compute minimum AC:

$$AC(4) = \frac{4}{2} + 2 + \frac{8}{4} = 2 + 2 + 2 = 6.$$

Step 4 — Verify MC = AC at $q^* = 4$:

$$MC(4) = 4 + 2 = 6 = AC(4). \quad \checkmark$$

This confirms $q^* = 4$ is the efficient scale and the minimum of AC.

Step 5 — Second-order condition:
$d^2(AC)/dq^2 = 16/q^3 > 0$ **at $q = 4$ — confirmed minimum. ✓**

Long-run equilibrium price: $P_{LR} = \min AC = 6$.

Final Answer: Long-run equilibrium price $= \boxed{6}$

Answer: (6) ↪ Go Back to Q#42

Solution

Concept — Simple Keynesian Multiplier $\|Chapter : Macroeconomics - - - FiscalPolicy :$

$InasimpleKeynesianmodelwithnogovernmentandnotrade, thegoodsmarketequilibriumconditionis$**Y = C + I.**$With$**C = MPC** $\cdot Y$ **and exogenous autonomous expenditure** A**:**

$$Y = A + MPC \cdot Y \implies Y(1 - MPC) = A \implies Y^* = \frac{A}{1 - MPC}.$$

Step 1 — Substitute given values:
Autonomous expenditure $A = 180$, $MPC = 0.8$**:**

$$Y^* = \frac{180}{1 - 0.8} = \frac{180}{0.2} = 900.$$

Step 2 — Interpretation:
The multiplier is $1/(1 - MPC) = 1/0.2 = 5$**. Each unit of autonomous expenditure generates** 5 **units of income through the circular flow.**

Verification: $C = 0.8 \times 900 = 720$**. Saving** $= 900 - 720 = 180 = A$**. Leakages = injections:** $S = I = 180$**. ✓**

Final Answer: $Y^* = 180/0.2 = \boxed{900}$

Answer: (900) ↪ Go Back to Q#43

Answer: (12) ↪ Go Back to Q#44

Solution

Concept — Inverse of a 2×2 Matrix $\|Chapter: Mathematics - - - Linear Algebra:$

For **A =** $\begin{pmatrix} a & b \\ c & d \end{pmatrix} with \det(A) = ad - bc \neq 0$**:**

$$A^{-1} = \frac{1}{\det(A)} \begin{pmatrix} d & -b \\ -c & a \end{pmatrix}.$$

Step 1 — Compute $\det(A)$**:**

$$A = \begin{pmatrix} 3 & 1 \\ 5 & 2 \end{pmatrix} \implies \det(A) = 3 \times 2 - 1 \times 5 = 6 - 5 = 1.$$

Step 2 — Compute A^{-1}**:**

$$A^{-1} = \frac{1}{1} \begin{pmatrix} 2 & -1 \\ -5 & 3 \end{pmatrix} = \begin{pmatrix} 2 & -1 \\ -5 & 3 \end{pmatrix}.$$

Step 3 — Extract the $(2,1)$ **element:**
The $(2,1)$ **element of** A^{-1} **is** -5**.**

Verification: $AA^{-1} = \begin{pmatrix} 3 & 1 \\ 5 & 2 \end{pmatrix} \begin{pmatrix} 2 & -1 \\ -5 & 3 \end{pmatrix} = \begin{pmatrix} 6-5 & -3+3 \\ 10-10 & -5+6 \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$. ✓

Final Answer: $(A^{-1})_{21} = \boxed{-5}$

Answer: (-5) ↪ Go Back to Q#45

Solution

Concept — Utility Maximisation with $U = x^{1/2}y^{1/2}$ $\|Chapter: Microeconomics - - - Consumer Theory:$

For **U =** $\mathbf{x^{\alpha}y^{\beta}}$ **with** $\alpha = \beta = 1/2$**, Marshallian demands:**

$$x^* = \frac{1/2 \cdot M}{p_x} = \frac{M}{2p_x}, \qquad y^* = \frac{1/2 \cdot M}{p_y} = \frac{M}{2p_y}.$$

Step 1 — Compute optimal demands:
$p_x = 4$**,** $p_y = 1$**,** $M = 20$**:**

$$x^* = \frac{20}{2 \times 4} = \frac{20}{8} = 2.5, \qquad y^* = \frac{20}{2 \times 1} = 10.$$

Step 2 — Compute maximum utility:

$$U^* = (x^*)^{1/2}(y^*)^{1/2} = \sqrt{x^* \cdot y^*} = \sqrt{2.5 \times 10} = \sqrt{25} = 5.$$

Budget check: $4(2.5) + 1(10) = 10 + 10 = 20$. ✓

Final Answer: $U^* = \boxed{5}$

Answer: (5) ↪ Go Back to Q#46

Answer: (2) ↪ Go Back to Q#47

Solution

Concept — Standard Error of the Regression $\|Chapter : Statistics\&Econometrics : Inasimplelinearregression$**Y =** $\beta_0 + \beta_1 X + \varepsilon$ **with** n **observations, the standard error of the regression (Root Mean Squared Error, RMSE) is:**

$$\hat{\sigma} = \sqrt{\frac{SSE}{n-2}},$$

where $SSE = \sum_{i=1}^{n} \hat{\varepsilon}_i^2$ **is the sum of squared residuals, and the denominator** $n - 2$ **corrects for the two estimated parameters (**β_0**,** β_1**).**

Step 1 — Substitute given values:
$n = 12$, $SSE = 40$**:**

$$\hat{\sigma} = \sqrt{\frac{40}{12-2}} = \sqrt{\frac{40}{10}} = \sqrt{4} = 2.$$

Interpretation: The average distance between observed and fitted values is 2 units (in the units of Y**).**

Final Answer: $\hat{\sigma} = \boxed{2}$

Answer: (2) ↪ Go Back to Q#48

Answer: (225) ↪ Go Back to Q#49

Answer: (120) ↪ Go Back to Q#50

Answer: (2000) ↪ Go Back to Q#51

Solution

Concept — Keynesian Open-Economy Equilibrium $\|Chapter : Macroeconomics---OpenEconomy :$

$Aggregateexpenditure$:**AE = C + I + G + X - M.**

Step 1 — Write the AE function:

$$C = 100 + 0.6Y, \quad I = 200, \quad G = 300, \quad X = 150, \quad M = 0.1Y.$$
$$AE = (100 + 0.6Y) + 200 + 300 + 150 - 0.1Y$$
$$= 750 + 0.5Y.$$

Step 2 — Equilibrium condition $Y = AE$:

$$Y = 750 + 0.5Y \implies 0.5Y = 750 \implies Y^* = 1{,}500.$$

Step 3 — Open-economy multiplier check:
Multiplier $= 1/(1 - 0.6 + 0.1) = 1/0.5 = 2$**. Autonomous expenditure** $= 100 + 200 + 300 + 150 = 750$**.** $Y^* = 2 \times 750 = 1{,}500$**.** ✓

Step 4 — Leakages = Injections check:
$S = Y - C = 1500 - (100 + 900) = 500$**.** $T = 0$ **(no taxes in this model).** $M = 0.1 \times 1500 = 150$**.** $I + G + X = 200 + 300 + 150 = 650$**.** $S + M = 500 + 150 = 650$**.** ✓

Final Answer: $Y^* = \boxed{1500}$

Answer: (1500) ↪ Go Back to Q#52

Answer: (10) ↪ Go Back to Q#53

Answer: (4) ↪ Go Back to Q#54

Solution

Concept — Change in Consumer Surplus $\|Chapter : Microeconomics - - - WelfareEconomics :$

$Consumersurplusistheareabelowthedemandcurveandabovetheprice.Whenpricerisesfrom$**P**$_0$ **to** P_1**, the decrease in CS is a trapezoid:**

$$\Delta CS = -\left[(P_1 - P_0)\,Q_1 + \tfrac{1}{2}(P_1 - P_0)(Q_0 - Q_1)\right] = -\tfrac{1}{2}(P_1 - P_0)(Q_0 + Q_1).$$

Step 1 — Compute quantities:
Demand: $P = 100 - 0.5Q \implies Q = 200 - 2P$**.**

$$Q_0 = 200 - 2(40) = 120; \quad Q_1 = 200 - 2(50) = 100.$$

Step 2 — Compute decrease in CS:

$$|\Delta CS| = \frac{1}{2}(P_1 - P_0)(Q_0 + Q_1) = \frac{1}{2}(10)(120 + 100) = \frac{1}{2}(10)(220) = 1{,}100.$$

Alternatively (trapezoid):
$|\Delta CS| = (P_1 - P_0)Q_1 + \frac{1}{2}(P_1 - P_0)(Q_0 - Q_1) = 10 \times 100 + \frac{1}{2} \times 10 \times 20 = 1000 + 100 = 1{,}100.$ ✓

Final Answer: Decrease in consumer surplus $= \boxed{1100}$

Answer: (1100) ↪ Go Back to Q#55

Answer: (112.5) ↪ Go Back to Q#56

Answer: (0.64) ↪ Go Back to Q#57

Solution

Concept — Compound Interest Future Value $\|Chapter : Mathematics - - - Financial Mathematics :$

$With annual compounding at rate$ **r**, $the future value of principal$ $\mathbf{P}_0$ **after** n **years is:**

$$FV = P_0(1 + r)^n.$$

Step 1 — Substitute:
$P_0 = 2{,}000$, $r = 10\% = 0.10$, $n = 3$:

$$FV = 2{,}000 \times (1.10)^3.$$

Step 2 — Compute $(1.10)^3$**:**

$$(1.10)^2 = 1.21; \quad (1.10)^3 = 1.21 \times 1.10 = 1.331.$$

Step 3 — Final answer:

$$FV = 2{,}000 \times 1.331 = 2{,}662.$$

Breakdown of interest earned:
Year 1: $2000 \times 0.10 = 200 \rightarrow$ **balance** $= 2200$.
Year 2: $2200 \times 0.10 = 220 \rightarrow$ **balance** $= 2420$.
Year 3: $2420 \times 0.10 = 242 \rightarrow$ **balance** $= 2662$. ✓

Final Answer: $FV =$ **Rs.** $\boxed{2662}$

Answer: (2662) ↪ Go Back to Q#58

Solution

Concept — Long-Run Equilibrium in Monopolistic Competition $\|Chapter$: $Microeconomics - - - MarketStructure$:

$Inthelongrun, freeentrydrivesprofittozero$:**P = AC**.$Simultaneously, firmsprofit - maximise$:**MR = MC**.

Step 1 — Set up:
$TC = 10Q + 100$, **so** $MC = 10$ **and** $AC = 10 + 100/Q$.
Demand: $P = 30 - Q$, **so** $MR = 30 - 2Q$.

Step 2 — Profit-maximisation ($MR = MC$**):**

$$30 - 2Q = 10 \implies 2Q = 20 \implies Q^* = 10.$$

Step 3 — Check zero-profit condition ($P = AC$**):**

$$P^* = 30 - 10 = 20. \quad AC(10) = 10 + \frac{100}{10} = 10 + 10 = 20 = P^*. \quad \checkmark$$

Step 4 — Check excess capacity:
$MC(10) = 10 < P^* = 20$ **— allocative inefficiency. Min AC occurs at** $dAC/dQ = -100/Q^2 = 0$**, which has no interior solution (AC is strictly decreasing), suggesting output below min AC: firm operates with excess capacity.** ✓**(For linear TC with fixed cost, AC is always decreasing, so** $Q^* = 10$ **is below any hypothetical minimum efficient scale if the market were larger.)**

Final Answer: LR equilibrium output $= \boxed{10}$

Answer: (10) ↪ Go Back to Q#59

Answer: (0.75) ↪ Go Back to Q#60

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	C	2	D	3	A	4	B	5	D
6	A	7	B	8	C	9	A	10	D
11	B	12	A	13	D	14	C	15	B
16	C	17	A	18	D	19	B	20	C
21	A	22	D	23	C	24	B	25	A
26	D	27	C	28	B	29	A	30	D
31	BC	32	AD	33	ABD	34	AC	35	BC
36	ACD	37	CD	38	AB	39	BD	40	AC
41	6	42	6	43	900	44	12	45	-5
46	5	47	2	48	2	49	225	50	120
51	2000	52	1500	53	10	54	4	55	1100
56	112.5	57	0.64	58	2662	59	10	60	0.75