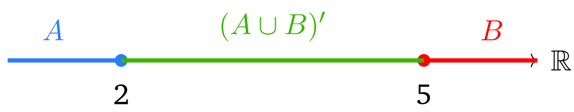
NEST Mathematics Sample Paper – 10

Duration: 45 Minutes | **Maximum Marks: 60**

Instructions

- This paper contains **20 Multiple Choice Questions (single correct answer)**, modelled on the Mathematics section of **NEST 2026**.
- Each correct answer carries **+3 marks**. There is a deduction of -1 **mark** for each incorrect answer; **no marks** are deducted for an unattempted question.
- Every question has exactly **four options**, of which only **one** is correct. Choose carefully.
- Personal calculators, log tables, mobile phones, and other electronic gadgets are strictly prohibited in the examination hall.
- A simple on-screen (virtual) calculator is provided in the computer-based test interface and may be used; blank sheets for rough work are supplied at the exam centre.

Q1. Let the universal set be $U = \mathbb{R}$. If $A = (-\infty, 2]$ and $B = [5, \infty)$, then the complement of $A \cup B$, namely $(A \cup B)'$, is



(A) $[2, 5]$

(B) $(2, 5)$

(C) $(-\infty, 2) \cup (5, \infty)$

(D) $\varnothing$

Q2. The value of the expression $\dfrac{\sin 75^\circ + \sin 15^\circ}{\cos 75^\circ + \cos 15^\circ}$ is

(A) $\sqrt{3}$

(B) $\frac{1}{\sqrt{3}}$

(C) 1

(D) $\frac{1}{2}$

Q3. If z is a non-zero complex number such that $z + \frac{1}{z}$ is a real number and z is not real, then which of the following must hold?

(A) $\arg z = \frac{\pi}{2}$

(B) $|z| = 2$

(C) z is purely imaginary

(D) $|z| = 1$

Q4. The number of onto (surjective) functions from a set A containing 4 elements to a set B containing 3 elements is

(A) 81

(B) 36

(C) 24

(D) 12

Q5. The remainder when 7^{83} is divided by 5 is

(A) 3

(B) 2

(C) 1

(D) 4

Q6. The sum of the series $1 \cdot 2 + 2 \cdot 3 + 3 \cdot 4 + \cdots + 10 \cdot 11$, that is $\sum_{n=1}^{10} n(n+1)$, is

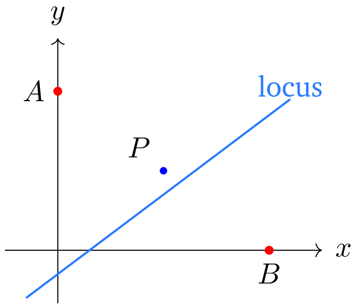
(A) 385

(B) 550

(C) 495

(D) 440

Q7. A point $P(x, y)$ moves so that its distance from the point $A(0, 3)$ is always equal to its distance from the point $B(4, 0)$. The locus of P is the straight line



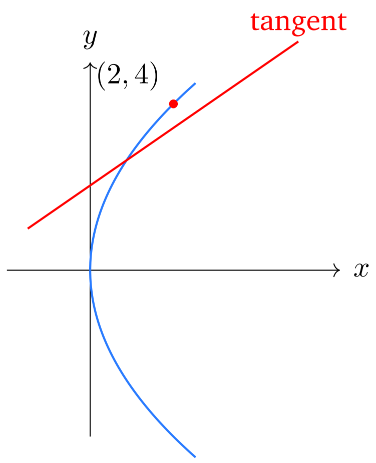
(A) $6x - 8y + 7 = 0$

(B) $8x + 6y - 7 = 0$

(C) $8x - 6y - 7 = 0$

(D) $4x - 3y = 0$

Q8. The equation of the tangent to the parabola $y^2 = 8x$ at the point $(2, 4)$ on it is



(A) $x + y - 6 = 0$

(B) $2x - y = 0$

(C) $x - 2y + 6 = 0$

(D) $x - y + 2 = 0$

Q9. If $f(x) = \log_2 x$, then the value of $f'(x)$ at $x = \dfrac{1}{\ln 2}$ is

(A) $\dfrac{1}{\ln 2}$

(B) $\ln 2$

(C) 1

(D) 2

Q10. Data set X has mean 40 and standard deviation 6, while data set Y has mean 25 and standard deviation 5. Comparing their coefficients of variation, the *more consistent* data set and the smaller coefficient of variation are

(A) Y, with 20%

(B) X, with 15%

(C) X, with 20%

(D) Y, with 15%

Q11. The value of $\sin^{-1}\left(\dfrac{3}{5}\right) + \sin^{-1}\left(\dfrac{4}{5}\right)$ is

(A) $\dfrac{\pi}{2}$

(B) $\dfrac{\pi}{4}$

(C) $\dfrac{2\pi}{3}$

(D) $\dfrac{3\pi}{4}$

Q12. The number of distinct 2×2 matrices all of whose four entries are chosen from the set $\{0,\ 1\}$ is

(A) 16

(B) 8

(C) 4

(D) 32

Q13. If A is a square matrix of order 3 with $\det A = 2$, then the value of $\det\left(A^4\right)$ is

(A) 8

(B) 16

(C) 32

(D) 64

Q14. If $y = \sin\left(\sqrt{1+x^2}\right)$, then $\dfrac{dy}{dx}$ at $x = 0$ is

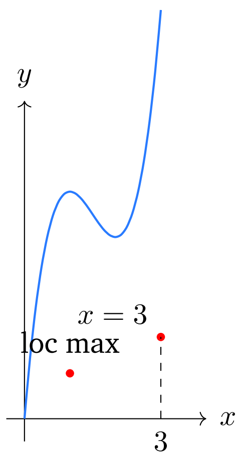
(A) $\cos 1$

(B) $\dfrac{\cos 1}{2}$

(C) $\sin 1$

(D) 0

Q15. The absolute maximum value of the function $f(x) = 2x^3 - 9x^2 + 12x$ on the closed interval $[0, 3]$ is



(A) 5

(B) 4

(C) 9

(D) 0

Q16. The value of the integral $\int e^x \left(\frac{1}{x} - \frac{1}{x^2}\right) dx$ is (with C an arbitrary constant)

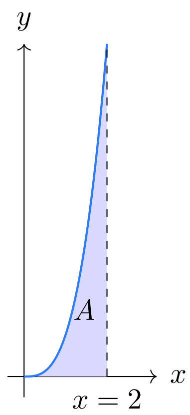
(A) $\frac{e^x}{x^2} + C$

(B) $e^x \ln x + C$

(C) $-\frac{e^x}{x} + C$

(D) $\frac{e^x}{x} + C$

Q17. The area of the region bounded by the curve $y = x^3$, the x-axis and the lines $x = 0$ and $x = 2$ is



(A) 4

(B) 8

(C) 16

(D) $\frac{16}{3}$

Q18. The particular solution of the differential equation $\frac{dy}{dx} = 2xy$ that satisfies $y = 1$ when $x = 0$ is

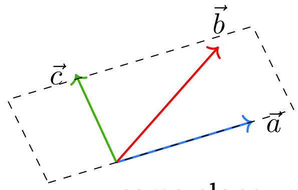
(A) $y = e^x$

(B) $y = e^{x^2}$

(C) $y = x^2 + 1$

(D) $y = e^{2x}$

Q19. The value of λ for which the three vectors $\vec{a} = \hat{i} + \hat{j} + \hat{k}$, $\vec{b} = 2\hat{i} - \hat{j} + \hat{k}$ and $\vec{c} = \hat{i} + \hat{j} + \lambda\hat{k}$ are coplanar is



same plane

(A) 1

(B) 0

(C) -1

(D) 2

Q20. A box contains 4 red balls and 6 green balls. If 3 balls are drawn at random together (without replacement), the probability that all three are green is

(A) $\frac{1}{2}$

(B) $\frac{1}{5}$

(C) $\frac{1}{6}$

(D) $\frac{3}{10}$

Detailed Solutions

Q1.

Solution

Concept — Complement of a union of intervals: On $U = \mathbb{R}$, the complement of a set consists of all real numbers *not* in that set. First form $A \cup B$, then take what is left over.

Step 1 — Form the union: $A = (-\infty, 2]$ covers everything up to and including 2; $B = [5, \infty)$ covers everything from 5 onward. So $A \cup B = (-\infty, 2] \cup [5, \infty)$.

Step 2 — Take the complement: The numbers left out are those strictly between 2 and 5, with the endpoints excluded (since $2 \in A$ and $5 \in B$). Hence $(A \cup B)' = (2, 5)$.

Why other options are wrong:

- (A) $[2, 5]$ wrongly includes 2 and 5, which already lie in $A \cup B$.
- (C) $(-\infty, 2) \cup (5, \infty)$ is essentially $A \cup B$ itself, not its complement.
- (D) $\varnothing$ would require $A \cup B = \mathbb{R}$, but the gap $(2, 5)$ is uncovered.

Final Answer: $(A \cup B)' = (2, 5) \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q1

Q2.

Solution

Concept — Sum-to-product identities: $\sin C + \sin D = 2 \sin \frac{C+D}{2} \cos \frac{C-D}{2}$ and $\cos C + \cos D = 2 \cos \frac{C+D}{2} \cos \frac{C-D}{2}$.

Step 1 — Numerator: $\sin 75° + \sin 15° = 2 \sin 45° \cos 30°$.

Step 2 — Denominator: $\cos 75° + \cos 15° = 2 \cos 45° \cos 30°$.

Step 3 — Divide: The common factor $2 \cos 30°$ cancels, leaving $\dfrac{\sin 45°}{\cos 45°} = \tan 45° = 1$.

Why other options are wrong:

- (A) $\sqrt{3} = \tan 60°$, the average-angle value misread.
- (B) $\frac{1}{\sqrt{3}} = \tan 30°$, using the half-difference angle instead of the half-sum.
- (D) $\frac{1}{2}$ comes from forgetting to cancel the cosine factor.

Final Answer: The value is $1 \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q2

Q3.

Solution

Concept — Reality of $z+\frac{1}{z}$: A complex number is real exactly when it equals its own conjugate. Write $z = r(\cos\theta + i\sin\theta)$ and impose the reality condition.

Step 1 — Use polar form: If $z = r(\cos\theta + i\sin\theta)$, then $\dfrac{1}{z} = \dfrac{1}{r}(\cos\theta - i\sin\theta)$. Adding,

$$z+\frac{1}{z} = \left(r+\frac{1}{r}\right)\cos\theta + i\left(r-\frac{1}{r}\right)\sin\theta.$$

Step 2 — Impose reality: The imaginary part must vanish: $\left(r-\frac{1}{r}\right)\sin\theta = 0$. Since z is not real, $\sin\theta \neq 0$, so $r-\frac{1}{r}=0$, giving $r^2=1$, i.e. $r=|z|=1$.

Why other options are wrong:

- (A) $\arg z = \frac{\pi}{2}$ makes z purely imaginary, but then $z+\frac{1}{z}$ is imaginary, not real, unless $|z|=1$ too.
- (B) $|z|=2$ leaves a non-zero imaginary part $(2-\frac{1}{2})\sin\theta$.
- (C) Purely imaginary z generally fails the reality condition.

Final Answer: $|z| = 1 \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q3

Q4.

Solution

Concept — Counting onto functions: For an onto map from an m-element set to an n-element set, use inclusion–exclusion: $\sum_{k=0}^{n}(-1)^k\binom{n}{k}(n-k)^m$.

Step 1 — Set up: Here $m=4$, $n=3$. Total functions $=3^4=81$.

Step 2 — Subtract non-onto: Remove maps missing at least one image: $\binom{3}{1}2^4 - \binom{3}{2}1^4 = 3\cdot 16 - 3\cdot 1 = 48-3=45$.

Step 3 — Onto count: $81-45=36$.

Why other options are wrong:

- (A) 81 counts *all* functions, not just onto ones.
- (C) 24 would be the number of one-to-one maps, impossible here since $|A| > |B|$.

- (D) 12 undercounts by mishandling the inclusion–exclusion terms.

Final Answer: 36 onto functions $\Rightarrow$ $\boxed{B}$

Answer: (B) Go Back to Q4

Q5.

Solution

Concept — Remainder via binomial expansion: Write the base as (multiple of the divisor $\pm$ small number), then expand; only the last term survives modulo the divisor.

Step 1 — Rewrite the base: $7 = 5 + 2$, so $7^{83} = (5 + 2)^{83} = \sum_{r=0}^{83} \binom{83}{r} 5^r 2^{83-r}$. Every term with $r \geq 1$ is divisible by 5; the remainder comes from $r = 0$, i.e. 2^{83}.

Step 2 — Reduce 2^{83} mod 5: Powers of 2 cycle mod 5 with period 4: $2, 4, 3, 1, \ldots$. Since $83 = 4 \cdot 20 + 3$, $2^{83} \equiv 2^3 = 8 \equiv 3 \pmod 5$.

Why other options are wrong:

- (B) 2 corresponds to exponent $\equiv 1 \pmod 4$, not 3.
- (C) 1 corresponds to exponent $\equiv 0 \pmod 4$.
- (D) 4 corresponds to exponent $\equiv 2 \pmod 4$.

Final Answer: remainder $= 3 \Rightarrow \boxed{A}$

Answer: (A) Go Back to Q5

Q6.

Solution

Concept — Sum of $n(n+1)$: Split into known sums: $\sum n(n+1) = \sum n^2 + \sum n = \frac{n(n+1)(2n+1)}{6} + \frac{n(n+1)}{2}$, which simplifies to $\frac{n(n+1)(n+2)}{3}$.

Step 1 — Use the compact formula: With $n = 10$, $\sum_{n=1}^{10} n(n+1) = \frac{10 \cdot 11 \cdot 12}{3}$.

Step 2 — Evaluate: $\frac{10 \cdot 11 \cdot 12}{3} = \frac{1320}{3} = 440$.

Why other options are wrong:

- (A) $385 = \sum_1^{10} n^2$ only, dropping the $\sum n$ part.
- (B) 550 is $\sum n^2 + 2\sum n$ or a similar miscount.

- (C) 495 uses the wrong upper limit or formula.

Final Answer: the sum is $440 \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q6

Q7.

Solution

Concept — Locus from an equal-distance condition: The set of points equidistant from two fixed points is the perpendicular bisector of the segment joining them. Set $PA^2 = PB^2$ and simplify.

Step 1 — Square both distances: $PA^2 = x^2 + (y-3)^2$ and $PB^2 = (x-4)^2 + y^2$. Equate:

$$x^2 + y^2 - 6y + 9 = x^2 - 8x + 16 + y^2.$$

Step 2 — Simplify: Cancel $x^2 + y^2$: $-6y + 9 = -8x + 16$, i.e. $8x - 6y - 7 = 0$.

Why other options are wrong:

- (A) $6x - 8y + 7 = 0$ swaps the x and y coefficients.
- (B) $8x + 6y - 7 = 0$ has the wrong sign on the y-term.
- (D) $4x - 3y = 0$ drops the constant (forgets the 9 and 16).

Final Answer: locus is $8x - 6y - 7 = 0 \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q7

Q8.

Solution

Concept — Tangent to $y^2 = 4ax$ at a point: The tangent at (x_1, y_1) on $y^2 = 4ax$ is $yy_1 = 2a(x + x_1)$.

Step 1 — Identify a and the point: $y^2 = 8x \Rightarrow 4a = 8 \Rightarrow a = 2$. The point is $(x_1, y_1) = (2, 4)$.

Step 2 — Write the tangent: $y \cdot 4 = 2 \cdot 2\,(x + 2)$, i.e. $4y = 4(x + 2) = 4x + 8$, so $y = x + 2$, that is $x - y + 2 = 0$.

Why other options are wrong:

- (A) $x + y - 6 = 0$ has the wrong sign on y (this is the normal direction, not the tangent).

- (B) $2x - y = 0$ ignores the constant term from x_1.
- (C) $x - 2y + 6 = 0$ uses $a = 1$ instead of $a = 2$.

Final Answer: tangent is $x - y + 2 = 0 \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q8

Q9.

Solution

Concept — Derivative of $\log_a x$: $\dfrac{d}{dx}\log_a x = \dfrac{1}{x\ln a}$.

Step 1 — Differentiate: For $f(x) = \log_2 x$, $f'(x) = \dfrac{1}{x\ln 2}$.

Step 2 — Evaluate at $x = \dfrac{1}{\ln 2}$:

$$f'\left(\tfrac{1}{\ln 2}\right) = \frac{1}{\left(\tfrac{1}{\ln 2}\right)\ln 2} = \frac{1}{1} = 1.$$

Why other options are wrong:

- (A) $\frac{1}{\ln 2}$ forgets to substitute the given x-value.
- (B) $\ln 2$ inverts the factor incorrectly.
- (D) 2 confuses the base with the derivative value.

Final Answer: $f' = 1 \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q9

Q10.

Solution

Concept — Coefficient of variation: $\text{CV} = \dfrac{\sigma}{\bar{x}} \times 100\%$. A *smaller* CV means *greater* consistency, regardless of the raw spread.

Step 1 — CV of X: $\text{CV}_X = \dfrac{6}{40} \times 100\% = 15\%$.

Step 2 — CV of Y: $\text{CV}_Y = \dfrac{5}{25} \times 100\% = 20\%$.

Step 3 — Compare: $15\% < 20\%$, so X is more consistent with $\text{CV} = 15\%$.

Why other options are wrong:

- (A) Y with 20% correctly computes Y but Y is the *less* consistent set.
- (C) X with 20% pairs X with Y's value.
- (D) Y with 15% swaps both the set and its CV.

Final Answer: X is more consistent, $\text{CV} = 15\% \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q10

Q11.

Solution

Concept — Complementary inverse sines: If $a^2 + b^2 = 1$ with $a, b \in [0, 1]$, then $\sin^{-1} a + \sin^{-1} b = \frac{\pi}{2}$, because the two angles are complementary.

Step 1 — Check the relation: With $a = \frac{3}{5}$, $b = \frac{4}{5}$: $a^2 + b^2 = \frac{9}{25} + \frac{16}{25} = 1$.

Step 2 — Conclude: Let $\alpha = \sin^{-1} \frac{3}{5}$ so $\cos \alpha = \frac{4}{5} = \sin \beta$ where $\beta = \sin^{-1} \frac{4}{5}$. Then $\alpha + \beta = \frac{\pi}{2}$.

Why other options are wrong:

- (B) $\frac{\pi}{4}$ would need both angles equal to $\frac{\pi}{8}$, which they are not.
- (C) $\frac{2\pi}{3}$ and (D) $\frac{3\pi}{4}$ exceed $\frac{\pi}{2}$; here the angles are exactly complementary.

Final Answer: the sum is $\frac{\pi}{2} \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q11

Q12.

Solution

Concept — Counting matrices by independent entries: Each of the 4 entries is filled independently; multiply the number of choices per slot.

Step 1 — Choices per entry: Each entry is from $\{0, 1\}$, giving 2 choices.

Step 2 — Multiply over four entries: $\text{Total} = 2 \times 2 \times 2 \times 2 = 2^4 = 16$.

Why other options are wrong:

- (B) $8 = 2^3$ counts only three entries.
- (C) $4 = 2^2$ counts only two entries.
- (D) $32 = 2^5$ counts a fifth entry that does not exist in a 2×2 matrix.

Final Answer: 16 matrices $\Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q12

Q13.

Solution

Concept — Determinant of a power: For any square matrix, $\det(A^n) = (\det A)^n$.

Step 1 — Apply the rule: $\det(A^4) = (\det A)^4 = 2^4$.

Step 2 — Evaluate: $2^4 = 16$.

Why other options are wrong:

- (A) $8 = 2^3$ uses the wrong exponent.
- (C) $32 = 2^5$ overcounts the power.
- (D) $64 = 2^6$ would multiply the exponent by the order 3 wrongly ($\det A \neq 2^3$ here).

Final Answer: $\det(A^4) = 16 \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q13

Q14.

Solution

Concept — Chain rule through multiple layers: Differentiate from the outside in: $\frac{d}{dx}\sin(u) = \cos(u)\, u'$, where $u = \sqrt{1+x^2}$.

Step 1 — Differentiate the inner root: With $u = \sqrt{1+x^2} = (1+x^2)^{1/2}$, $u' = \frac{1}{2}(1+x^2)^{-1/2} \cdot 2x = \frac{x}{\sqrt{1+x^2}}$.

Step 2 — Assemble: $\frac{dy}{dx} = \cos\big(\sqrt{1+x^2}\big) \cdot \frac{x}{\sqrt{1+x^2}}$.

Step 3 — Evaluate at $x = 0$: The factor $x = 0$ makes the whole derivative 0 (the cosine term is finite, $\cos 1$).

Why other options are wrong:

- (A) $\cos 1$ keeps the outer factor but forgets the x in the numerator.
- (B) $\frac{\cos 1}{2}$ uses $u' = \frac{1}{2}$ at $x = 0$, which is wrong since $u'(0) = 0$.
- (C) $\sin 1$ differentiates incorrectly (keeps the function instead of its derivative).

Final Answer: $\left.\frac{dy}{dx}\right|_{x=0} = 0 \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q14

Q15.

Solution

Concept — Absolute extrema on a closed interval: Evaluate f at the critical points inside $[a, b]$ and at the endpoints; the largest value is the absolute maximum.

Step 1 — Critical points: $f'(x) = 6x^2 - 18x + 12 = 6(x^2 - 3x + 2) = 6(x-1)(x-2)$. So $x = 1, 2 \in [0, 3]$.

Step 2 — Evaluate candidates: $f(0) = 0$; $f(1) = 2 - 9 + 12 = 5$; $f(2) = 16 - 36 + 24 = 4$; $f(3) = 54 - 81 + 36 = 9$.

Step 3 — Choose the largest: The values are $\{0, 5, 4, 9\}$; the absolute maximum is 9, attained at the endpoint $x = 3$.

Why other options are wrong:

- (A) 5 is only the *local* maximum at $x = 1$, not the absolute one.
- (B) 4 is the local minimum value at $x = 2$.
- (D) 0 is the value at the other endpoint $x = 0$.

Final Answer: absolute maximum $= 9 \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q15

Q16.

Solution

Concept — The form $\int e^x[f(x) + f'(x)]\,dx = e^x f(x) + C$: Recognise the integrand as e^x times a function plus its own derivative.

Step 1 — Identify f and f': Let $f(x) = \frac{1}{x}$. Then $f'(x) = -\frac{1}{x^2}$. So the integrand is exactly $e^x\left(\frac{1}{x} - \frac{1}{x^2}\right) = e^x\left[f(x) + f'(x)\right]$.

Step 2 — Apply the standard result: $\int e^x[f(x)+f'(x)]\,dx = e^x f(x) + C = \frac{e^x}{x} + C$.

Why other options are wrong:

- (A) $\frac{e^x}{x^2}$ takes $f(x) = \frac{1}{x^2}$, whose derivative does not match.

- (B) $e^x \ln x$ would arise from $f'(x) = \frac{1}{x}$, the wrong association.
- (C) $-\frac{e^x}{x}$ has the wrong sign.

Final Answer: $\frac{e^x}{x} + C \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q16

Q17.

Solution

Concept — Area under a curve: For $y = f(x) \geq 0$ on $[a, b]$, the area is $\int_a^b f(x)\,dx$. On $[0, 2]$, $x^3 \geq 0$.

Step 1 — Set up: $A = \int_0^2 x^3\,dx$.

Step 2 — Integrate: $\int_0^2 x^3\,dx = \left[\frac{x^4}{4}\right]_0^2 = \frac{16}{4} - 0 = 4$.

Why other options are wrong:

- (B) 8 uses $\frac{x^3}{3}$ at $x = 2$ (wrong antiderivative), or evaluates x^3 directly.
- (C) 16 forgets to divide by 4.
- (D) $\frac{16}{3}$ integrates x^2 instead of x^3.

Final Answer: $A = 4 \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q17

Q18.

Solution

Concept — Variable-separable DE: Separate the variables, integrate both sides, then use the initial condition to fix the constant.

Step 1 — Separate and integrate: $\frac{dy}{y} = 2x\,dx \Rightarrow \int \frac{dy}{y} = \int 2x\,dx \Rightarrow \ln|y| = x^2 + C_1$.

Step 2 — Exponentiate: $y = Ce^{x^2}$, where $C = e^{C_1}$.

Step 3 — Apply $y(0) = 1$: $1 = Ce^0 = C$, so $C = 1$ and $y = e^{x^2}$.

Why other options are wrong:

- (A) $y = e^x$ solves $\frac{dy}{dx} = y$, not $2xy$.

- (C) $y = x^2 + 1$ does not satisfy $\frac{dy}{dx} = 2xy$ (it gives $2x$, not $2xy$).
- (D) $y = e^{2x}$ solves $\frac{dy}{dx} = 2y$.

Final Answer: $y = e^{x^2} \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q18

Q19.

Solution

Concept — Coplanarity via scalar triple product: Three vectors are coplanar iff their scalar triple product (the 3×3 determinant of their components) is zero.

Step 1 — Form the determinant:

$$\begin{vmatrix} 1 & 1 & 1 \\ 2 & -1 & 1 \\ 1 & 1 & \lambda \end{vmatrix} = 0.$$

Step 2 — Expand along row 1:

$$1\big[(-1)\lambda - 1\big] - 1\big[2\lambda - 1\big] + 1\big[2 - (-1)\big] = (-\lambda - 1) - (2\lambda - 1) + 3.$$

This equals $-\lambda - 1 - 2\lambda + 1 + 3 = -3\lambda + 3$.

Step 3 — Solve: $-3\lambda + 3 = 0 \Rightarrow \lambda = 1$.

Why other options are wrong:

- (B) 0, (C) -1, (D) 2 each give a non-zero triple product, so the vectors would not be coplanar.

Final Answer: $\lambda = 1 \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q19

Q20.

Solution

Concept — Probability by combinations (without replacement): For an unordered draw, $P = \dfrac{\text{favourable combinations}}{\text{total combinations}}$.

Step 1 — Total ways: Choosing 3 from 10 balls: $\binom{10}{3} = \dfrac{10 \cdot 9 \cdot 8}{3 \cdot 2 \cdot 1} = 120$.

Step 2 — Favourable ways: All three green from 6: $\binom{6}{3} = \dfrac{6 \cdot 5 \cdot 4}{3 \cdot 2 \cdot 1} = 20$.

Step 3 — Probability: $P = \dfrac{20}{120} = \dfrac{1}{6}$.

Why other options are wrong:

- (A) $\frac{1}{2}$ uses $\frac{6}{12}$, mishandling the counts.
- (B) $\frac{1}{5}$ comes from $\binom{6}{3}/100$ or a similar slip.
- (D) $\frac{3}{10}$ uses a with-replacement estimate incorrectly.

Final Answer: $P = \dfrac{1}{6} \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q20

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	B	2	C	3	D	4	B	5	A
6	D	7	C	8	D	9	C	10	B
11	A	12	A	13	B	14	D	15	C
16	D	17	A	18	B	19	A	20	C