TOPIC 1 *Number & Algebra*

01 An arithmetic sequence has first term $a_1 = 3$ and common difference $d = 4$. Find the 10th term a_{10}.

> 💡 *Use $a_n = a_1 + (n-1)d$.*

A) 35

B) 39

C) 43

D) 31

---

02 A geometric sequence has $a_1 = 2$ and common ratio $r = 3$. Find a_5.

> 💡 *Use $a_n = a_1 \cdot r^{n-1}$.*

A) 54

B) 108

C) 162

D) 486

---

03 Find the sum of the first 10 terms of the arithmetic series with $a_1 = 1$ and $d = 2$.

> 💡 $S_n = \frac{n}{2}(2a_1 + (n-1)d)$.

A) 90

B) 95

C) 100

D) 110

---

04 Find the sum of the first 4 terms of the geometric series $1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8}$.

> 💡 $S_n = a_1 \frac{1 - r^n}{1 - r}$.

A) $\frac{7}{8}$

B) $\frac{15}{8}$

C) $\frac{31}{16}$

D) 2

---

05 In the expansion of $(1 + x)^4$, find the coefficient of x^2.

> 💡 *Use the binomial coefficient $\binom{n}{r}$.*

A) 4

B) 6

C) 8

D) 12

---

06 In the expansion of $(2+x)^3$, what is the coefficient of x^2?

> 💡 *The general term is $\binom{3}{r} \cdot 2^{3-r} \cdot x^r$.*

A A) 3

B B) 6

C C) 12

D D) 4

---

07 Solve $2^x = 16$.

> 💡 *Express 16 as a power of 2.*

A A) $x = 3$

B B) $x = 4$

C C) $x = 5$

D D) $x = 8$

---

08 Evaluate $\log_2 8$.

> 💡 *Ask: to what power must 2 be raised to get 8?*

A A) 2

B B) 3

C C) 4

D D) 8

---

09 Evaluate $\log_3 81$.

> 💡 $81 = 3^{?}$

A A) 3

B B) 4

C C) 9

D D) 27

---

10 Solve $\log_{10}(x) + \log_{10}(x-3) = 1$.

> 💡 *Combine logs: $\log_{10}(x(x-3)) = 1$, then $x(x-3) = 10$.*

A A) $x = 2$

B B) $x = 5$

C C) $x = 10$

D D) $x = 4$

---

11 Solve $3^{2x} = 27$.

> 💡 *Write 27 as a power of 3, then equate exponents.*

A A) $x = 1$

B B) $x = \frac{3}{2}$

C C) $x = 3$

D D) $x = \frac{2}{3}$

---

12 Find the sum to infinity of the geometric series $6 + 2 + \frac{2}{3} + \cdots$

> 💡 $S_\infty = \frac{a}{1-r}$, *valid when* $|r| < 1$.

A A) 8

B B) 9

C C) 10

D D) 12

---

13 Find the arithmetic mean of 2 and 8.

> 💡 *The arithmetic mean of two numbers* a *and* b *is* $\frac{a+b}{2}$.

A A) 4

B B) 5

C C) 6

D D) 3

---

14 In the expansion of $(x+2)^4$, find the coefficient of x^3.

> 💡 *General term:* $\binom{4}{r} x^{4-r} \cdot 2^r$. *Set* $4 - r = 3$.

A A) 4

B B) 6

C C) 8

D D) 16

---

15 Simplify $\log_a(a^5)$.

> 💡 *Use the log power rule:* $\log_a(a^n) = n$.

A A) a^5

B B) 5

C C) $5a$

D D) $\frac{1}{5}$

---

16 The nth term of a sequence is $u_n = 3n - 1$. Which term equals 29?

> 💡 *Set $3n - 1 = 29$ and solve for n.*

A A) 9th

B B) 10th

C C) 11th

D D) 8th

---

17 A geometric series has $a_1 = 12$ and $r = \frac{1}{4}$. Find S_∞.

> 💡 $S_\infty = \frac{a}{1 - r}$.

A A) 14

B B) 15

C C) 16

D D) 18

---

18 Solve $\log_2(x) + \log_2(x - 6) = 4$.

> 💡 $\log_2[x(x - 6)] = 4 \Rightarrow x(x - 6) = 16$.

A A) $x = 6$

B B) $x = 7$

C C) $x = 8$

D D) $x = 10$

---

19 If $f(x) = x^2 + bx + c$ has roots $x = 2$ and $x = 5$, find $b + c$.

> 💡 *By Vieta's formulas, sum of roots $= -b$, product $= c$.*

A A) 3

B B) 7

C C) -3

D D) 10

---

20 Solve $|2x - 4| = 6$. Which pair is correct?

> 💡 *Split into two cases: $2x - 4 = 6$ or $2x - 4 = -6$.*

A A) $x = 3$ or $x = -1$

B B) $x = 5$ or $x = -1$

C C) $x = 5$ or $x = 1$

D D) $x = 3$ or $x = -5$

TOPIC 2 *Functions*

21 If $f(x) = 2x + 3$, find $f(4)$.

> 💡 *Substitute $x = 4$.*

A A) 9

B B) 10

C C) 11

D D) 12

---

22 Find the zeros of $f(x) = x^2 - 4$.

> 💡 *Set $f(x) = 0$ and solve.*

A A) $x = 4$ only

B B) $x = 2$ only

C C) $x = \pm 2$

D D) $x = \pm 4$

---

23 If $f(x) = 3x - 6$, find $f^{-1}(9)$.

> 💡 *First find $f^{-1}(x) = \dfrac{x + 6}{3}$, then substitute.*

A A) 3

B B) 5

C C) 7

D D) 9

---

24 Find the vertex of $y = x^2 - 6x + 5$.

> 💡 *Vertex is at $x = -\dfrac{b}{2a}$.*

A A) $(2, -3)$

B B) $(3, -4)$

C C) $(3, 4)$

D D) $(-3, -4)$

---

25 How many real roots does $f(x) = x^2 + 2x - 8$ have?

> 💡 *Compute the discriminant $\Delta = b^2 - 4ac$.*

A A) No real roots

B B) One repeated root

C C) Two distinct real roots

D D) Cannot determine

---

26 What is the domain of $f(x) = \sqrt{x - 3}$?

> 💡 *The expression under the square root must be ≥ 0.*

A A) $x \geq 0$

B B) $x > 3$

C C) $x \geq 3$

D D) All real numbers

---

27 If $f(x) = 2x$ and $g(x) = x + 1$, find $f(g(3))$.

> 💡 *Compute $g(3)$ first, then apply f.*

A A) 6

B B) 7

C C) 8

D D) 10

---

28 The graph of $y = f(x)$ is shifted 3 units right. The new function is:

> 💡 *Horizontal shifts: replace x with $x - h$ to shift right by h.*

A A) $y = f(x + 3)$

B B) $y = f(x - 3)$

C C) $y = f(x) + 3$

D D) $y = f(x) - 3$

---

29 Find the horizontal asymptote of $y = \dfrac{3}{x + 2} + 1$.

> 💡 *As $x \to \pm\infty$, the fraction $\to 0$.*

A A) $y = 0$

B B) $y = 1$

C C) $y = 3$

D D) $y = -2$

---

30 What is the range of $f(x) = x^2 + 1$ for $x \in \mathbb{R}$?

> 💡 *The minimum of x^2 is 0, achieved at $x = 0$.*

A A) All real numbers

B B) $y \geq 0$

C C) $y \geq 1$

D D) $y > 1$

---

31 Solve $2^x = 5$. Give the exact answer.

> 💡 *Take* log *of both sides:* $x = \log_2 5 = \dfrac{\ln 5}{\ln 2}$.

A A) $x = \dfrac{\ln 2}{\ln 5}$

B B) $x = \dfrac{\ln 5}{\ln 2}$

C C) $x = \ln 5 - \ln 2$

D D) $x = 5 \div 2$

---

32 Complete the square: $x^2 + 6x + 5 =$?

> 💡 *Add and subtract* $\left(\dfrac{6}{2}\right)^2 = 9$.

A A) $(x+3)^2 - 4$

B B) $(x+3)^2 + 4$

C C) $(x+6)^2 - 4$

D D) $(x+3)^2 - 9$

---

33 How many real solutions does $2x^2 + 3x + 5 = 0$ have?

> 💡 *Calculate* $\Delta = b^2 - 4ac$.

A A) Two distinct real solutions

B B) One repeated real solution

C C) No real solutions

D D) Infinitely many

---

34 If $f(x) = e^x$, which statement is true about $f^{-1}(x)$?

> 💡 *The inverse of the exponential function is the natural logarithm.*

A A) $f^{-1}(x) = x^e$

B B) $f^{-1}(x) = \ln x$

C C) $f^{-1}(x) = e^{-x}$

D D) $f^{-1}(x) = \log_{10} x$

---

35 The quadratic $f(x) = x^2 - 4x + k$ has no real roots. What values can k take?

> 💡 *For no real roots,* $\Delta = b^2 - 4ac < 0$.

A A) $k < 4$

B B) $k > 4$

C C) $k = 4$

D D) $k \geq 4$

---

36 If $g(x) = x + 3$ and $f(x) = x^2$, find $f(g(x))$.

> 💡 *Substitute $g(x)$ into f.*

A A) $x^2 + 3$

B B) $x^2 + 6x + 9$

C C) $x^2 + 3x$

D D) $(x + 3)^2 - 9$

---

37 An exponential model is $P(t) = 500 \cdot 2^t$. Find t when $P = 4000$.

> 💡 *$2^t = 8$. What power of 2 gives 8?*

A A) $t = 2$

B B) $t = 3$

C C) $t = 4$

D D) $t = 8$

---

38 Find the x-intercepts of $f(x) = x^2 - x - 6$.

> 💡 *Factor or use the quadratic formula.*

A A) $x = 2, 3$

B B) $x = -2, 3$

C C) $x = 2, -3$

D D) $x = -2, -3$

---

39 The function $f(x) = a \cdot b^x$ passes through $(0, 4)$ and $(2, 36)$. Find b.

> 💡 *At $x = 0$: $a = 4$. At $x = 2$: $4b^2 = 36$.*

A A) 2

B B) 3

C C) 4

D D) 9

---

40 If $f(x) = \ln(x)$, find $f(e^3)$.

> 💡 *Use the property $\ln(e^k) = k$.*

A A) e^3

B B) $3e$

C C) 3

D D) $\ln 3$

TOPIC 3 *Geometry & Trigonometry*

41 Find the exact value of $\sin 30^\circ$.

> 💡 *Recall the special angle table.*

A A) $\frac{\sqrt{3}}{2}$

B B) $\frac{1}{2}$

C C) $\frac{\sqrt{2}}{2}$

D D) 1

---

42 Find the exact value of $\cos 60^\circ$.

> 💡 *Recall the special angle table.*

A A) $\frac{\sqrt{3}}{2}$

B B) $\frac{\sqrt{2}}{2}$

C C) $\frac{1}{2}$

D D) 0

---

43 Find the area of a triangle with $b = 6$, $c = 8$, and included angle $A = 30^\circ$.

> 💡 *Area* $= \frac{1}{2}bc\sin A$.

A A) 6

B B) 12

C C) 24

D D) 48

---

44 Convert 180° to radians.

> 💡 *Use the conversion:* π rad $= 180^\circ$.

A A) 2π

B B) $\frac{\pi}{2}$

C C) π

D D) $\frac{3\pi}{2}$

---

45 Convert $\frac{\pi}{3}$ radians to degrees.

> 💡 *Multiply by* $\frac{180^\circ}{\pi}$.

A A) 30°

B B) 45°

C C) 60°

D D) 90°

46 Find the exact value of $\tan 45^\circ$.

> 💡 $\tan\theta = \dfrac{\sin\theta}{\cos\theta}$.

A A) 0

B B) $\dfrac{1}{\sqrt{2}}$

C C) $\sqrt{3}$

D D) 1

---

47 What does the identity $\sin^2\theta + \cos^2\theta$ equal?

> 💡 *This is the fundamental Pythagorean identity.*

A A) 0

B B) $\sin 2\theta$

C C) 1

D D) 2

---

48 Find the period of $y = \sin(2x)$.

> 💡 *Period of* $\sin(bx)$ *is* $\dfrac{2\pi}{b}$.

A A) 2π

B B) 4π

C C) π

D D) $\dfrac{\pi}{2}$

---

49 What is the amplitude of $y = 3\sin(x)$?

> 💡 *Amplitude is the coefficient in front of sin.*

A A) π

B B) 1

C C) 6

D D) 3

---

50 A sector has radius $r = 4$ and central angle $\theta = \dfrac{\pi}{3}$. Find the arc length.

> 💡 *Arc length* $= r\theta$.

A A) $\dfrac{4\pi}{3}$

B B) $\dfrac{2\pi}{3}$

C C) 4π

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

---

51 A sector has radius $r = 6$ and central angle $\theta = \dfrac{\pi}{4}$. Find the area.

> 💡 *Sector area* $= \frac{1}{2}r^2\theta$.

A) $\dfrac{9\pi}{4}$

B) $\dfrac{9\pi}{2}$

C) 9π

D) 6π

---

52 If $\sin\theta = \dfrac{3}{5}$ and θ is acute, find $\tan\theta$.

> 💡 *Use a right triangle: opposite = 3, hypotenuse = 5, so adjacent = 4.*

A) $\dfrac{3}{4}$

B) $\dfrac{4}{3}$

C) $\dfrac{4}{5}$

D) $\dfrac{5}{3}$

---

53 In triangle ABC, $a = 5$, $A = 30^\circ$, $B = 60^\circ$. Find side b.

> 💡 *Sine rule:* $\dfrac{a}{\sin A} = \dfrac{b}{\sin B}$.

A) 5

B) $5\sqrt{2}$

C) $5\sqrt{3}$

D) 10

---

54 In triangle ABC, $b = 5$, $c = 7$, $A = 60^\circ$. Find a^2.

> 💡 *Cosine rule:* $a^2 = b^2 + c^2 - 2bc\cos A$.

A) $74 - 35$

B) $74 - 35 = 39$

C) $74 + 35 = 109$

D) $25 + 49 = 74$

---

55 Solve $\sin\theta = \dfrac{1}{2}$ for $0^\circ \le \theta \le 360^\circ$.

> 💡 $\sin\theta = \frac{1}{2}$ *at* 30° *in Q1. Where else is sine positive?*

A) 30° only

B) 30° and 150°

C) 30° and 210°

D) 150° and 210°

56 Find all solutions to $\cos\theta = -\dfrac{\sqrt{3}}{2}$ for $0^\circ \le \theta < 360^\circ$.

> 💡 $\cos\theta < 0$ *in Q2 and Q3. Reference angle is* 30°.

A A) $120^\circ, 240^\circ$

B B) $150^\circ, 210^\circ$

C C) $120^\circ, 300^\circ$

D D) $60^\circ, 300^\circ$

---

57 The exact value of $\sin\left(\dfrac{5\pi}{6}\right)$ is:

> 💡 $\dfrac{5\pi}{6} = \pi - \dfrac{\pi}{6}$. *Use* $\sin(\pi - x) = \sin x$.

A A) $-\dfrac{1}{2}$

B B) $\dfrac{\sqrt{3}}{2}$

C C) $\dfrac{1}{2}$

D D) $-\dfrac{\sqrt{3}}{2}$

---

58 In a right triangle, the angle is 45° and the adjacent side is 5. Find the hypotenuse.

> 💡 $\cos 45^\circ = \dfrac{\text{adjacent}}{\text{hypotenuse}}$.

A A) 5

B B) $5\sqrt{2}$

C C) $5\sqrt{3}$

D D) 10

---

59 Using the sine rule: $a = 7, b = 10, B = 90^\circ$. Find A to 1 d.p.

> 💡 $\sin A = \dfrac{a\sin B}{b} = \dfrac{7}{10}$.

A A) 30.0°

B B) 44.4°

C C) 50.0°

D D) 60.0°

---

60 Prove that $\tan^2\theta + 1 = \sec^2\theta$. Which identity is this derived from?

> 💡 *Divide* $\sin^2\theta + \cos^2\theta = 1$ *by* $\cos^2\theta$.

A A) Sum-to-product formula

B B) Double angle formula

C C) Pythagorean identity

D D) Compound angle formula

TOPIC 4 *Statistics & Probability*

61 Find the mean of the data set $\{2, 4, 6, 8, 10\}$.

> 💡 *Mean* $= \dfrac{\text{sum}}{n}$.

A) 5 | B) 6

C) 7 | D) 8

---

62 Find the median of $\{3, 5, 7, 9, 11\}$.

> 💡 *Order the data and find the middle value.*

A) 5 | B) 6

C) 7 | D) 9

---

63 Events A and B are independent. $P(A) = 0.3$, $P(B) = 0.5$. Find $P(A \cap B)$.

> 💡 *For independent events:* $P(A \cap B) = P(A) \times P(B)$.

A) 0.80 | B) 0.20

C) 0.15 | D) 0.65

---

64 Using $P(A) = 0.3$, $P(B) = 0.5$, and $P(A \cap B) = 0.15$, find $P(A \cup B)$.

> 💡 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$.

A) 0.65 | B) 0.80

C) 0.45 | D) 0.35

---

65 $X \sim B(5, 0.4)$. Find $P(X = 2)$.

> 💡 $P(X = k) = \binom{n}{k} p^k (1-p)^{n-k}$.

A) 0.230 | B) 0.346

C) 0.400 | D) 0.259

---

66 $X \sim N(60, 10^2)$. Find the Z-score of $x = 70$.

> 💡 $Z = \dfrac{x - \mu}{\sigma}$.

A A) $Z = 0.5$

B B) $Z = 1$

C C) $Z = 2$

D D) $Z = 10$

---

67 Find $P(A')$ given $P(A) = 0.7$.

> 💡 $P(A') = 1 - P(A)$.

A A) 0.7

B B) 0.3

C C) 1.7

D D) 0.07

---

68 Find $P(A|B)$ given $P(A \cap B) = 0.2$ and $P(B) = 0.5$.

> 💡 $P(A|B) = \dfrac{P(A \cap B)}{P(B)}$.

A A) 0.10

B B) 0.25

C C) 0.40

D D) 0.70

---

69 A discrete random variable X takes values 1, 2, 3 with probabilities 0.2, 0.5, 0.3. Find $E(X)$.

> 💡 $E(X) = \sum x_i \cdot P(X = x_i)$.

A A) 2.0

B B) 2.1

C C) 2.5

D D) 1.5

---

70 If $E(X) = 3$ and $\mathrm{Var}(X) = 4$, find $E(2X + 5)$.

> 💡 $E(aX + b) = aE(X) + b$.

A A) 9

B B) 11

C C) 13

D D) 17

---

71 Using the same $\text{Var}(X) = 4$ from above, find $\text{Var}(2X + 5)$.

> 💡 $\text{Var}(aX + b) = a^2\text{Var}(X)$.

A A) 8

B B) 13

C C) 16

D D) 24

---

72 Two dice are rolled. Find $P(\text{both show } 6)$.

> 💡 *The rolls are independent: multiply probabilities.*

A A) $\frac{1}{6}$

B B) $\frac{1}{12}$

C C) $\frac{1}{36}$

D D) $\frac{2}{36}$

---

73 $X \sim B(3, 0.5)$. Find $P(X \geq 1)$.

> 💡 $P(X \geq 1) = 1 - P(X = 0)$.

A A) 0.500

B B) 0.750

C C) 0.875

D D) 0.937

---

74 $X \sim N(70, 10^2)$. Using the standard normal table, find $P(X > 75)$.

> 💡 *Standardize:* $Z = \frac{75 - 70}{10} = 0.5$, *then* $P(Z > 0.5) = 1 - P(Z < 0.5)$.

A A) 0.1915

B B) 0.3085

C C) 0.6915

D D) 0.5000

---

75 Events A and B are mutually exclusive. What is $P(A \cap B)$?

> 💡 *Mutually exclusive means they cannot both occur.*

A A) $P(A) + P(B)$

B B) $P(A) \times P(B)$

C C) 1

D D) 0

---

76 A bag contains 3 red and 2 blue balls. Two balls are drawn without replacement. Find $P(\text{both red})$.

> 💡 $P(R_1) = \frac{3}{5}$, then $P(R_2|R_1) = \frac{2}{4}$.

A) $\frac{9}{25}$

B) $\frac{3}{10}$

C) $\frac{1}{5}$

D) $\frac{6}{25}$

---

77 The standard deviation of $\{2, 4, 6, 8, 10\}$ as a population is:

> 💡 $\sigma = \sqrt{\frac{\sum(x-\mu)^2}{n}}$. The mean is 6.

A) 2

B) $2\sqrt{2}$

C) 4

D) $\sqrt{10}$

---

78 Compound interest: $P = \$1000$, $r = 5\%$ per year, $t = 2$ years, compounded annually. Find A.

> 💡 $A = P(1+r)^t$.

A) \$1100.00

B) \$1102.50

C) \$1105.00

D) \$1010.25

---

79 A Venn diagram shows $P(A) = 0.6$, $P(B) = 0.4$, $P(A \cup B) = 0.8$. Find $P(A \cap B)$.

> 💡 Rearrange $P(A \cup B) = P(A) + P(B) - P(A \cap B)$.

A) 0.1

B) 0.2

C) 0.4

D) 0.5

---

80 $X \sim B(n, p)$. The mean is $E(X) = np$. If $n = 10$ and $p = 0.3$, find the variance.

> 💡 $\text{Var}(X) = np(1-p)$.

A) 1.5

B) 2.1

C) 3.0

D) 4.0

TOPIC 5 *Calculus*

81 Differentiate $f(x) = x^3$.

> 💡 *Power rule:* $\frac{d}{dx}(x^n) = nx^{n-1}$.

A A) $3x^2$

B B) $x^4/4$

C C) $3x^3$

D D) x^2

---

82 Differentiate $f(x) = 5x^2 - 3x + 2$.

> 💡 *Differentiate term by term using the power rule.*

A A) $5x - 3$

B B) $10x - 3$

C C) $10x + 2$

D D) $5x^2 - 3$

---

83 Differentiate $f(x) = \sin x$.

> 💡 *Recall the standard derivative of* $\sin x$.

A A) $-\cos x$

B B) $\cos x$

C C) $\sin x$

D D) $-\sin x$

---

84 Differentiate $f(x) = \ln x$.

> 💡 *This is a standard result to memorise.*

A A) $\ln x$

B B) e^x

C C) $\frac{1}{x}$

D D) $x \ln x$

---

85 Evaluate $\int_0^2 (2x + 3)\,dx$.

> 💡 *Integrate term by term, then apply limits.*

A A) 6

B B) 8

C C) 10

D D) 12

---

86 Find the gradient of $y = x^2$ at $x = 3$.

> 💡 *Differentiate, then substitute $x = 3$.*

A A) 3

B B) 6

C C) 9

D D) 12

---

87 Apply the chain rule: find $\dfrac{d}{dx}\sin(2x)$.

> 💡 *Chain rule: derivative of outer × derivative of inner.*

A A) $\cos(2x)$

B B) $2\sin(2x)$

C C) $2\cos(2x)$

D D) $-2\cos(2x)$

---

88 Find the stationary point(s) of $f(x) = x^2 - 4x + 3$.

> 💡 *Set $f'(x) = 0$ and solve.*

A A) $x = 0$

B B) $x = 2$

C C) $x = 3$

D D) $x = 4$

---

89 Classify the stationary point of $f(x) = x^2 - 4x + 3$ at $x = 2$.

> 💡 *Evaluate $f''(x)$ at $x = 2$.*

A A) Local maximum

B B) Point of inflection

C C) Local minimum

D D) Cannot determine

---

90 Evaluate $\displaystyle\int_0^{\pi} \sin x \, dx$.

> 💡 $\int \sin x \, dx = -\cos x + C$.

A A) 0

B B) 1

C C) 2

D D) π

---

91 A particle moves with position $s(t) = t^2 + 2t$. Find its velocity at $t = 3$.

> 💡 *Velocity $v(t) = s'(t)$.*

A) 5

B) 6

C) 8

D) 9

---

92 Find the equation of the tangent to $y = e^x$ at $x = 0$.

> 💡 *Find $y(0)$ and $y'(0)$, then use $y - y_1 = m(x - x_1)$.*

A) $y = x$

B) $y = x + 1$

C) $y = e^x$

D) $y = x - 1$

---

93 Evaluate $\displaystyle\int_0^2 x^2\,dx$.

> 💡 $\int x^2\,dx = \dfrac{x^3}{3} + C$.

A) $\dfrac{4}{3}$

B) $\dfrac{8}{3}$

C) 4

D) $\dfrac{8}{9}$

---

94 Integrate by substitution: $\displaystyle\int 2x(x^2+1)^3\,dx$.

> 💡 *Let $u = x^2 + 1$, then $du = 2x\,dx$.*

A) $\dfrac{(x^2+1)^4}{4} + C$

B) $\dfrac{(x^2+1)^3}{3} + C$

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

D) $8x(x^2+1)^2 + C$

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95 Find the area enclosed between $y = x$ and $y = x^2$ from $x = 0$ to $x = 1$.

> 💡 *Area $= \displaystyle\int_0^1 (x - x^2)\,dx$.*

A) $\dfrac{1}{3}$

B) $\dfrac{1}{4}$

C) $\dfrac{1}{6}$

D) $\dfrac{1}{2}$

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96 Find all stationary points of $f(x) = x^3 - 3x^2$.

> 💡 $f'(x) = 3x^2 - 6x = 3x(x-2) = 0$.

A) $x = 0$ only

B) $x = 2$ only

C) $x = 0$ and $x = 2$

D) $x = 0$ and $x = 3$

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97 Find an inflection point of $f(x) = x^3 - 3x^2$.

> 💡 *Set $f''(x) = 0$ and verify sign change.*

A) $x = 0$

B) $x = 1$

C) $x = 2$

D) $x = 3$

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98 Evaluate $\displaystyle\int_1^2 (3x^2 - 2x + 1)\,dx$.

> 💡 *Integrate term by term: $\int 3x^2 = x^3$, $\int -2x = -x^2$, $\int 1 = x$.*

A) 3

B) 4

C) 5

D) 6

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99 The product rule: find $\dfrac{d}{dx}[x \cdot e^x]$.

> 💡 $(uv)' = u'v + uv'$.

A) e^x

B) xe^x

C) $e^x(x+1)$

D) xe^{x-1}

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100 Find the area enclosed by $y = 4 - x^2$ and the x-axis.

> 💡 *Find where $y = 0$: $x = \pm 2$. Then integrate.*

A) $\dfrac{16}{3}$

B) 8

C) $\dfrac{32}{3}$

D) 16

Answer Key

01. B	02. C	03. C	04. B	05. B
06. B	07. B	08. B	09. B	10. B
11. B	12. B	13. B	14. C	15. B
16. B	17. C	18. C	19. A	20. B
21. C	22. C	23. B	24. B	25. C
26. C	27. C	28. B	29. B	30. C
31. B	32. A	33. C	34. B	35. B
36. B	37. B	38. B	39. B	40. C
41. B	42. C	43. B	44. C	45. C
46. D	47. C	48. C	49. D	50. A
51. B	52. A	53. C	54. B	55. B
56. B	57. C	58. B	59. B	60. C
61. B	62. C	63. C	64. A	65. B
66. B	67. B	68. C	69. B	70. B
71. C	72. C	73. C	74. B	75. D
76. B	77. B	78. B	79. B	80. B
81. A	82. B	83. B	84. C	85. C
86. B	87. C	88. B	89. C	90. C
91. C	92. B	93. B	94. A	95. C
96. C	97. B	98. C	99. C	100. C