CBSE Class 12 Mathematics

(SET–3) Answers key

Section A – MCQ Answers

1. 4
2. 1/4
3. 3
4. Perpendicular
5. 2
6. 0.72
7. 1/x
8. 0
9. 1
10. 2(x−1)+3y+4z=0
11. −cos x
12. e^{3x}/3 + C
13. 0
14. 3
15. 1/2
16. Product of diagonal elements
17. x^4 + C
18. 0
19. tan x + C
20. 3

Section B

21. Determinant

$$| A |= (3 \times 4 - 2 \times 1) = 12 - 2 = 10$$

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22. Differentiation

$$y = x^2 \cos\ x$$

Product rule:

$$\frac{dy}{dx} = 2x\cos\ x - x^2 \sin\ x$$

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23. Tangent Equation

$$y = \sin\ x$$
$$dy/dx = \cos\ x$$

At x=0 → slope=1

Point (0,0)

$$y = x$$

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24. Integration

$$\int (2x + 3)dx = x^2 + 3x + C$$

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25. Magnitude

$$| a |= \sqrt{9 + 16 + 144}$$
$$= \sqrt{169} = 13$$

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26. Probability (Prime on Die)

Prime numbers = 2,3,5

$$P = 3/6 = 1/2$$

Section C

27. Solve

x = 3
y = 1

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28. Differentiation

Given:

$$x^3 + y^3 = 9xy$$

Differentiate:

$$3x^2 + 3y^2 \frac{dy}{dx} = 9(x \frac{dy}{dx} + y)$$
$$\frac{dy}{dx} = \frac{9y - 3x^2}{3y^2 - 9x}$$

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29. Definite Integral

$$\int_0^1 (1 - x)dx$$
$$= \frac{1}{2}$$

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30. Collinear

(3,6,9) = 3(1,2,3)

Hence collinear.

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31. Two Coins

Outcomes = HH, HT, TH, TT

Exactly one head = 2

$$P = 2/4 = 1/2$$

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32. Differential Equation

$$dy/dx = 2x$$
$$y = x^2 + C$$

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33. Area

$$\int_0^3 2x dx$$
$$= [x^2]_0^3 = 9$$

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34. Plane Equation

General form:

$$x + y + z = 1$$

Section D

35. Determinant

$$| A | = 1$$

Since |A| ≠ 0, matrix invertible

$$A^{-1} = adj(A)$$

(Computed by cofactor method in exam)

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36. Mean Value Theorem

$$\frac{f(1)-f(0)}{1-0}=1$$

f'(x)=$3x^2$

$3c^2=1$

$$c=\frac{1}{\sqrt{3}}$$

Condition satisfied.

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37. Integration by Parts

$$\int x^2 e^x dx$$
$$= e^x(x^2-2x+2)+C$$

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38. Shortest Distance

Using formula:

$$SD=\frac{|\,(a_2-a_1)\cdot(b_1\times b_2)\,|}{|\,b_1\times b_2\,|}$$

(Final value after solving = 2)

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39. Variance

Mean:

$$=0(0.3)+1(0.4)+2(0.3)=1$$

$E(X^2)$=

$$=0+0.4+1.2=1.6$$

Variance:

$$=1.6-1^2=0.6$$

40. Differential Equation

$$x\frac{dy}{dx} = y$$
$$\frac{dy}{y} = \frac{dx}{x}$$
$$\ln\ y = \ln\ x + C$$
$$y = Cx$$