CBSE Class 12 Mathematics

SET–1 Answer Key

Section A – MCQs (1×20)

1. |2A| = 2^3 | A |= $8 \times 5 = 40$→ **(c)**

2. f'(x)=3x^2−6x ⇒ f'(1)=3−6=−3 → **None (correct value −3)**

3. Highest order derivative is d^2y/dx^2→ **Order = 2 (b)**

4. Perpendicular ⇒ a·b=0 → **(b)**

5. $\int_0^1$ x dx = $[\,x^2/2\,]_0^1 = 1/2$ → **(b)**

6. Probability of head = 1/2 → **(c)**

7. Mutually exclusive ⇒ P(A∩B)=0 → **(a)**

8. Skew symmetric ⇒ diagonal elements = 0 → **(c)**

9. d/dx (sin x)=cos x → **(a)**

10. ∫e^x dx = e^x + C → **(a)**

11. |x| differentiable for x≠0 → **(b)**

12. |A|= (2×4−3×1)=8−3=5 → **(a)**

13. dy/dx=ky ⇒ y=Ce^{kx} → **(b)**

14. Limit =1 → **(b)**

15. Independent ⇒ P(A∩B)=P(A)P(B) → **(b)**

16. Distance = √[(3)^2+(4)^2+0]=5 → **(a)**

17. (i+j)·(i−j)=1−1=0 → **(c)**

18. ∫1/x dx= ln|x|+C → **(c)**

19. Orthogonal ⇒ A^{T}A=I → **(b)**

20. Vector form correct ⇒ x=1+2t, y=2+t, z=3−t → **(d)**

Section B (2 Marks Each)

Q21. Inverse of

$$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$

|A|=4−6=−2

$$A^{-1} = \frac{1}{-2}\begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix} = \begin{bmatrix} -2 & 1 \\ 3/2 & -1/2 \end{bmatrix}$$

Q22. Differentiate $y = \ln(x^2 + 1)$

$$\frac{dy}{dx} = \frac{1}{x^2 + 1} \times 2x = \frac{2x}{x^2 + 1}$$

Q23. Tangent to $y = x^2$ at x=1

$$dy/dx = 2x$$

At x=1, slope=2

Point (1,1)

Equation:

$$y - 1 = 2(x - 1)$$

Q24. ∫x² dx

$$= x^3/3 + C$$

Q25. Direction cosines of 2i−3j+6k

Magnitude:

$$\sqrt{4 + 9 + 36} = 7$$

Direction cosines:

$$(2/7, -3/7, 6/7)$$

Q26. Probability sum 8 (two dice)

Favourable: (2,6),(3,5),(4,4),(5,3),(6,2) = 5

Total =36

$$P = 5/36$$

Section C (3 Marks Each)

Q27. Solve:

2x+y=5
x−y=1

Add equations:

3x=6 ⇒ x=2

Substitute:

2−y=1 ⇒ y=1

Q28. If $x^2 + y^2 = 25$

Differentiate:

2x+2y(dy/dx)=0

$$dy/dx = -x/y$$

Q29. $\int_0^2 x^2\, dx$

$$= [x^3/3]_0^2 = 8/3$$

Q30. (1,2,3) & (2,4,6)

Second vector =2× first

Hence collinear.

Q31. 3 Red, 2 Blue

Total ways = 5C2=10

Red ways =3C2=3

$$P = 3/10$$

Q32. dy/dx=x+y

Linear form:

$$dy/dx - y = x$$

IF=e^{-x}

Solution:

$$y = Ce^x - x - 1$$

Q33. Area under y=x (0→2)

$$\int_0^2 xdx = [x^2/2]_0^2 = 2$$

Q34. Plane through (1,1,1) normal (1,2,3)

$$1(x - 1) + 2(y - 1) + 3(z - 1) = 0$$
$$x + 2y + 3z = 6$$

Section D (4 Marks Each)

Q35. Matrix invertible since |A| ≠0

(After expansion |A|=1)

Hence invertible. (Adjoint method steps in exam)

Q36. Lagrange MVT for f(x)=x² [1,3]

f(3)=9, f(1)=1

$$\frac{f(3) - f(1)}{3 - 1} = 4$$

f'(x)=2x

2c=4 ⇒ c=2 ∈(1,3)

Verified.

Q37. ∫xe^x dx

By parts:

= xe^x − ∫e^x dx

= xe^x − e^x + C

= e^x(x−1)+C

Q38. Shortest distance (formula)

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

(Apply in exam – final value 2√3)

Q39. Mean & Variance

Mean:

$$= 0(0.1) + 1(0.3) + 2(0.4) + 3(0.2) = 1.7$$

E(X^2)=

=0+0.3+1.6+1.8=3.7

Variance:

$$= 3.7 - (1.7)^2 = 3.7 - 2.89 = 0.81$$

Q40. (x+y)dx+(x−y)dy=0

Rearranging & solving:

$$dy/dx = -(x + y)/(x - y)$$

Solution:

$$x^2 - y^2 = C$$