

1. $\int x \sin x^2 dx =$

- (a) $\frac{1}{2} \cos x^2 + C$
- (b) $-\frac{1}{2} \cos x^2 + C$
- (c) $-\cos x^2$
- (d) $\cos x^2 + C$
- (e) None of the above.

2. $\int \frac{\ln x}{x} dx =$

- (a) $\ln(\ln x) + C$
- (b) $\frac{1}{2} (\ln x)^2 + C$
- (c) $\ln(x^2) + C$
- (d) $\frac{1}{2} (\ln x)^2$
- (e) None of the above.

3. $\int \frac{dx}{\sqrt{9-x^2}} =$

- (a) $3\sqrt{9-x^2} + C$
- (b) $\frac{1}{3} \sin^{-1}(x/2) + C$
- (c) $\frac{1}{3} \tan^{-1}(x/2) + C$
- (d) $\sin^{-1}(x/3) + C$
- (e) None of the above.

4. $\int xe^{2x} dx =$

- (a) $xe^{2x} - \frac{1}{2}e^{2x} + C$
- (b) $\frac{1}{2}e^{2x} - \frac{1}{4}xe^{2x} + C$
- (c) $-\frac{1}{2}xe^{2x} + \frac{1}{4}e^{2x} + C$
- (d) $\frac{1}{2}xe^{2x} - \frac{1}{4}e^{2x} + C$
- (e) None of the above.

5. $\int x \ln x \, dx =$

- (a) $\frac{1}{2}x^2 \ln x - \frac{1}{4}x^2 + C$
- (b) $x^2 \ln x - \frac{1}{2}x^2 + C$
- (c) $2x^2 \ln x - x^2 + C$
- (d) $x \ln x - x + C$
- (e) None of the above.

6. The order of the differential equation $\frac{d^2y}{dx^2} + 4x \frac{dy}{dx} = \frac{d^3(\cos 2x)}{dx^3}$ is:

- (a) 4
- (b) 3
- (c) 2
- (d) 1
- (e) None of the above.

7. The order of the differential equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^3 u}{\partial x^2 \partial y} + \frac{\partial^2 u}{\partial y^2} = xy \frac{\partial u}{\partial x}$ is:

- (a) 4
- (b) 3
- (c) 2
- (d) 1
- (e) None of the above.

8. The set of all solutions of $y' - 4x = 6e^{2x}$ is:

- (a) $y = 2x^2 + 3e^{2x} + C$
- (b) $y = -2x^2 + Ce^{2x}$
- (c) $y = 2x^2 + 3e^{2x} + Cx$
- (d) $y = 3e^{2x} - 2x^2 + C$
- (e) None of the above.

9. The set of all solutions of $\frac{dy}{dx} = 3y$ is:

- (a) $y = e^{3x}$
- (b) $y = Ce^{-3x}$
- (c) $y = e^{3x} + C$
- (d) $y = Ce^{3x}$
- (e) None of the above.

10. The set of all solutions of $y'' = 12x^2 - 4 \cos 2x + 6$ is:

(a) $y = x^4 - \cos 2x + 6x + Cx$

(b) $y = x^4 + \sin 2x + 3x^2 + C$

(c) $y = x^4 + \cos 2x + 3x^2 + C_1x + C_2$

(d) $y = x^4 - \sin 2x + 6x^2 + C_1x^2 + C_2x$

(e) None of the above.

11. The value(s) of λ such that $y = e^{\lambda x}$ is a solution of

$$y'' - 2y' - 15y = 0$$

are:

(a) $\lambda = 5$

(b) $\lambda = -5, \lambda = 3$

(c) $\lambda = -3, \lambda = 5$

(d) $\lambda = 5, \lambda = 3$

(e) None of the above.

12. The value(s) of λ such that $y = x^\lambda$ is a solution of

$$x^2y'' + 7xy' + 9y = 0$$

are:

(a) $\lambda = 3$

(b) $\lambda = -3, \lambda = 3$

(c) $\lambda = 0, \lambda = -3$

(d) $\lambda = -3$

(e) None of the above.