1. \(3xy^2 y' = 5x^2 y - 4x^3\) is
   (a) a linear equation.
   (b) a separable equation.
   (c) a Bernoulli equation.
   (d) a homogeneous equation.
   (e) none of the above.

2. \(xy' = 2x^3 y - 4x^2 y^{-2}\) is
   (a) a linear equation.
   (b) a separable equation.
   (c) a Bernoulli equation.
   (d) a homogeneous equation.
   (e) none of the above.

3. \(y' = x^2 \left(x \sin y - 2xy\right)\) is
   (a) a linear equation.
   (b) a separable equation.
   (c) a Bernoulli equation.
   (d) a homogeneous equation.
   (e) none of the above.

4. \(2y' + 2x^2 - 3x^{-1} y = 0\) is
   (a) a linear equation.
   (b) a separable equation.
   (c) a Bernoulli equation.
   (d) a homogeneous equation.
   (e) none of the above.

5. \(2y' + 2x^2 y^3 - 3x^{-1} y = 0\) is
   (a) a linear equation.
   (b) a separable equation.
   (c) a Bernoulli equation.
   (d) a homogeneous equation.
   (e) none of the above.
6. $2xyy' = 2y^2 + x^2 \cos(y/x)$ is
   (a) a linear equation.
   (b) a separable equation.
   (c) a Bernoulli equation.
   (d) a homogeneous equation.
   (e) none of the above.

7. The linear operator $L$ is defined by $L[y] = y' - \frac{1}{x} y$. Calculate $L[x^2 + 2x]$.
   (a) $3x$
   (b) $4x + 4$
   (c) $x$
   (d) $4x - 4$
   (e) None of the above.

8. The general solution of $y' = 6xy^{1/3} - \frac{3y}{x}$ is:
   (a) $y^2 = \left(\frac{x^4 + C}{x^2} \right)^3$
   (b) $y = \left(\frac{x^2 + C}{x} \right)^2$
   (c) $y = \left(x + \frac{C}{x} \right)^{3/2}$
   (d) $y^{2/3} = C(1 + x^2)$
   (e) None of the above.

9. The general solution of $xy' = 6x^2e^{3x} + y$ is
   (a) $y = 2xe^{3x} + C$
   (b) $y = 2e^{3x} + Cx$
   (c) $y = 2xe^{3x} + Cx$
   (d) $y = xe^{3x} + Cx^2$
   (e) None of the above.
10. The general solution of \( \frac{dy}{dx} = \frac{x^3 + y^3}{xy^2} \) is:

(a) \( y^2 = x^2 \ln Cx^2 \)
(b) \( y^3 = x \ln Cx^3 \)
(c) \( y^2 = x^2 \ln x^3 + Cx^2 \)
(d) \( y^3 = x^3 \ln Cx^3 \)
(e) None of the above.

11. The general solution of \( xe^{y/x} \frac{dy}{dx} = x + ye^{y/x} \) is

(a) \( y = x \ln(Cx) \)
(b) \( y = x \ln(\ln x + C) \)
(c) \( y = x \ln(\ln x) + Cx \)
(d) \( y = x \ln x + Cx \)
(e) None of the above.

12. The general solution of \( 2y \frac{dy}{dx} = 2xy^2 + 2x - y^2 - 1 \) is:

(a) \( y^2 = Ce^{x^2-x} - 1 \)
(b) \( y^2 = e^{x^2-x} + C \)
(c) \( y^2 = Cx^{x-1} - 1 \)
(d) \( y^2 = Ce^{x^2-x} + C \)
(e) None of the above.

13. The general solution of \( x^2 y' + 2xy - y^3 = 0 \) is:

(a) \( y^2 = \frac{4x}{C x^2 + 1} \)
(b) \( y^2 = \frac{2 + Cx^5}{3x} \)
(c) \( y^2 = \frac{2 + Cx^5}{5x} \)
(d) \( y^2 = \frac{2 + Cx^4}{5x} \)
(e) None of the above.
14. The general solution of \( y' = \frac{x^3 + x^2y + 3y^3}{x^3 + 3xy^2} \) is:

(a) \( y^3 + x^2y = \ln x^3 + Cx^3 \)
(b) \( y^3 + x^2y = x^3 \ln x + Cx^3 \)
(c) \( y^3 + x^2y = \ln x + C \)
(d) \( y^3 + x^3 = x^3 \ln x + C \)
(e) None of the above.

15. The general solution of \( x^2y' + 2y = 2e^{1/x} \sqrt{y} \) is:

(a) \( y^{1/2} = e^{1/x} \left( \frac{Cx - 1}{x} \right) \)
(b) \( y^{1/2} = \frac{1}{x} e^{1/x} + Cx \)
(c) \( y^{1/2} = e^{1/x} \left( \frac{C - x}{x} \right) \)
(d) \( y^{1/2} = xe^{1/x}(Cx + 1) \)
(e) None of the above.

16. The solution of the initial-value problem \( xy' + y = x^4y^4, \ y(1) = 1 \) is:

(a) \( y^3 = x^3(4 - 3x) \)
(b) \( y = \frac{1}{x (4 - 3x)^{1/3}} \)
(c) \( y^3 = \frac{1}{x (3x - 4)} \)
(d) \( y = \frac{1}{x (4 - 3x)^3} \)
(e) None of the above.