

EMCF Quiz 2 Due January 24 at 11:59 PM

Question 1

Find the general solution of

$$xy' - 2y = -x$$

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

Question 2

Give the general solution of

$$xy' + 3y = -2x + \ln(x)$$

- a) $y = -\frac{1}{2}x + \frac{1}{3}\ln(x) - \frac{1}{9} + C$
- b) $y = -\frac{2}{3}x - \frac{1}{3}\ln(x) + \frac{1}{9} + \frac{C}{x^3}$
- c) $y = -\frac{2}{3}x + \frac{\ln(x)}{x^3} - \frac{1}{3x^{3x}} + C$

d) $y = -\frac{5}{6} + \frac{1}{3} \ln(x) + \frac{C}{x^3}$

e) $y = -\frac{1}{2}x + \frac{\ln(x)}{x^3} - \frac{1}{9x^{3x}} + C$

f) None of the above.

Question 3

Give the solution to the initial value problem

$$\left[\begin{array}{l} y' + \frac{2y}{x} = -\frac{3}{x} \\ y(1) = 1 \end{array} \right]$$

a) $y = -\frac{3}{2} - \frac{7}{2x^2}$

b) $y = -3 - \frac{5}{2x^2}$

c) $y = -\frac{3}{2} + \frac{5}{2x^2}$

d) $y = -3 - \frac{1}{2x^2}$

e) $y = -\frac{3}{2} - \frac{1}{2x^2}$

f) None of the above.

Question 4

If $y = y(x)$ is a solution of

$$y' + 4y = 3e^{-3x} + 2$$

Find

$$\lim_{x \rightarrow \infty} y(x)$$

- a) 0
- b) $\frac{3}{7}$
- c) $\frac{3}{4}$
- d) Does not exist.
- e) $\frac{1}{2}$
- f) None of the above.

Question 5

Give the general solution to

$$x^2 y' - 2xy = \cos(4x) x^4$$

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

Question 6

Find the general solution of

$$\frac{dy}{dx} + y \cot(x) = 5 \csc^3 x$$

a) $y = \frac{5 \cot(x)}{\sin(x)} + C \sin(x)$

b) $y = -\frac{5 \cot(x)}{\sin(x)} + C$

c) $y = -\frac{5 \tan(x)}{\sin(x)} + C$

d) $y = -\frac{5 \cot(x)}{\sin(x)} + \frac{C}{\sin(x)}$

e) $y = \frac{5 \cot(x)}{\sin(x)} + \frac{C}{\sin(x)}$

f) None of the above.

Question 7

Give the general solution of

$$y' = \frac{y^2 - 3}{xy - 6y}$$

a) $y^2 = C(x - 6)^2 + 3$

b) $y^2 - 3 = (x - 6)^2 + C$

c) $\ln(y^2 - 3) = x^2 - 12x + C$

d) $y^2 - 3 = C e^{x-6}$

e) $y^2 = C(x - 6) + 3$

f) None of the above.

Question 8

Give the general solution of

$$\frac{dy}{dx} = 4xy^2 - 4x + 6y^2 - 6$$

a) $\ln(y^2 - 1) = C e^{4x^2 + 12x}$

b) $\frac{y-1}{y+1} = Ce^{4x^2+6x}$

c) $\frac{y+1}{y-1} = Ce^{4x^2+6x}$

d) $\frac{y-1}{y+1} = Ce^{4x^2+12x}$

e) $\frac{y+1}{y-1} = Ce^{4x^2+12x}$

f) None of the above.

Question 9

Give the general solution of

$$y' = 2e^{(6x-y)}$$

a) $y = 2 \ln\left(\frac{1}{6} e^{6x} + C\right)$

b) $e^{-y} = 2e^{6x} + C$

c) $y = \ln\left(\frac{1}{3} e^{6x} + C\right)$

d) $6e^y = 2ce^{6x}$

e) $y = \frac{1}{3} e^{6x} + C$

f) None of the above.

Question 10

Find the general solution of

$$y' = 2x^2(1+y^2)$$

a) $y = \arctan\left(\frac{2}{3}x^3 + C\right)$

b) $y = \tan\left(\frac{2}{3}x^3\right) + C$

c) $y = \tan(2x^2 + C)$

d) $y = \arctan\left(\frac{2}{3}x^3\right) + C$

e) $y = \tan\left(\frac{2}{3}x^3 + C\right)$

f) None of the above.

Question 11

Find a solution that satisfies the following conditions:

$$\left[xy' + y = 5xe^x, \quad y(-2) = \frac{13}{2}e^{-2} \right]$$

a) $y = 5e^x - \frac{5e^x}{x}$

b) $y = 5e^x - \frac{5e^x}{x} + \frac{2e^{-2}}{x}$

c) $y = 5e^x - \frac{5e^x}{x} - \frac{2e^{-2}}{x}$

d) $y = 5xe^x - \frac{5e^x}{x} + \frac{2e^{-2}}{x}$

e) $y = 5xe^x - 5e^x + 2e^{-2}$

f) None of the above.

Question 12

Find the general solution of

$$y' = \frac{4y + 2xy}{xy^2 + 5x}$$

a) $y^2 - 5 \ln |y| = -4 \ln |x| - 2x + C$

- b) $y^2 + 10 \ln |y| = 8 \ln |x| + 4x + C$
- c) $y^2 - 15 \ln |y| = -4 \ln |x| - 8x + C$
- d) $y^2 - 10 \ln |y| = -8 \ln |x| - 4x + C$
- e) $y^2 + 5 \ln |y| = 4 \ln |x| + 2x + C$
- f) None of the above.

Question 13

Find the general solution of

$$y' = \frac{4x(y^2 - 4)}{x^2 + 3}.$$

- a) $y = \frac{1 + (x^2 + 3)^4}{1 - (x^2 + 3)^4}$
- b) $y = \frac{2 - 2(x^2 + 3)^4}{1 + (x^2 + 3)^4}$
- c) $y = \frac{1 + C(x^2 + 3)^8}{1 - C(x^2 + 3)^8}$
- d) $y = \frac{2 + 2C(x^2 + 3)^8}{1 - C(x^2 + 3)^8}$
- e) $y = \frac{2 + 2(x^2 + 3)^4}{1 - (x^2 + 3)^4}$

f) $y = \frac{1 - C(x^2 + 3)^8}{1 + C(x^2 + 3)^8}$

g) None of the above.