

SOLUTION:

$$d(x^3) - 3d(x^2y) = d(c)$$

$$3x^2dx - 3x^2dy - 6xydx = 0$$

Since the equation is divisible by $3x$, then reduce it into lowest term.

Thus,

$$\frac{3x^2dx}{3x} - \frac{3x}{3x} xdy - \frac{3x}{3x} 2ydx = 0$$

$$xdx - xdy - 2ydx = 0 \quad (\text{ans.})$$

$$2. \quad y \sin x - xy^2 = C$$

SOLUTION:

$$y d(\sin x) + \sin x d(y) - x d(y^2) - y^2 d(x) = d(c)$$

$$y \cos x dx + \sin x dy - 2xy dy - y^2 dx = 0$$

$$y(\cos x - y) dx + (\sin x - 2xy) dy = 0 \quad (\text{ans.})$$

$$3. \quad y = C_1 \sin 2x + C_2 \cos 2x$$

SOLUTION:

$$y' = 2C_1 \cos 2x - 2C_2 \sin 2x$$

$$y'' = -4C_1 \sin 2x - 4C_2 \cos 2x$$

$$y'' = -4(C_1 \sin 2x + C_2 \cos 2x)$$

Since $y = C_1 \sin 2x + C_2 \cos 2x$, thus the differential equation is,

$$y'' = -4y \quad (\text{ans.})$$

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