

Each problem is worth 5 points. For full credit provide proper justification for your answer.

1. Determine whether $y = 3\sin 2x$ is a solution to the differential equation $\frac{d^2y}{dx^2} = -4y$.

$$y' = 6\cos(2x)$$

$$y'' = -12\sin(2x)$$

$$-12\sin(2x) = -4(3\sin(2x))$$

$$-12\sin(2x) = -12\sin(2x)$$

yes

Excellent

2. Determine whether the function $y = 3xe^{-x}$ is a solution to the differential equation $3y + y' = y/x$.

$$3(3xe^{-x}) + (3xe^{-x})' = \frac{3xe^{-x}}{x}$$

$$9xe^{-x} + [3x(-e^{-x}) + 3e^{-x}] = 3e^{-x}$$

$$9xe^{-x} - 3xe^{-x} + 3e^{-x} = 3e^{-x}$$

Nice Work

$6xe^{-x} + 3e^{-x} \neq 3e^{-x} \rightarrow y = 3xe^{-x}$ is not
a solution