

Quiz #4

Directions: Carefully read each question below and answer to the best of your ability in the space provided. Your answer to problems should be written in a clear and concise manner.

You **MUST** show your work to receive full credit!

1. (5 points) Solve the following differential equation

$$(x + 3)\frac{dy}{dx} - y^2 = 0.$$

Solution:

$$\begin{aligned}(x + 3)\frac{dy}{dx} - y^2 &= 0 \\(x + 3)\frac{dy}{dx} &= y^2 \\ \frac{dy}{y^2} &= \frac{dx}{x + 3} \\ \int \frac{dy}{y^2} &= \int \frac{dx}{x + 3} \\ -\frac{1}{y} &= \ln|x + 3| + C \\ \frac{1}{y} &= C - \ln|x + 3| \\ y &= \frac{1}{C - \ln|x + 3|}\end{aligned}$$

2. (5 points) Find the particular solution of the differential equation

$$\frac{dy}{dx} + 5x = 8$$

satisfying the initial condition $y(0) = 5$.

Solution:

$$\begin{aligned}\frac{dy}{dx} + 5x &= 8 \\ \frac{dy}{dx} &= 8 - 5x \\ dy &= (8 - 5x)dx \\ \int dy &= \int (8 - 5x)dx \\ y &= 8x - \frac{5}{2}x^2 + C\end{aligned}$$

Since $y(0) = 5$, then

$$y(0) = 8 \cdot 0 - \frac{5}{2} \cdot 0^2 + C = C = 5.$$

Thus

$$y = 8x - \frac{5}{2}x^2 + 5.$$

Name: _____

Section (circle one): 001 002

Question:	1	2	Total
Points:	5	5	10
Score:			