

Math 240 - Quiz 3

September 7, 2023

Name key

Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (5 points) Solve: $xy' + 2y = 8x^2$, $y(1) = 4$

$$y' + \frac{2}{x}y = 8x$$

$$\mu(x) = e^{\int \frac{2}{x} dx} = e^{2 \ln|x|}$$

$$= |x|^2 = x^2$$

$$x^2 y' = \int x^2 (8x) dx$$

$$= \int 8x^3 dx$$

$$x^2 y = 2x^4 + C$$

$$y(x) = 2x^2 + \frac{C}{x^2}$$

$$y(1) = 4 \Rightarrow C = 2$$

$$y(x) = 2x^2 + \frac{2}{x^2}$$

2. (5 points) Solve: $(1-x)y' = y^2$

$$\frac{dy}{dx} = \frac{y^2}{1-x}$$

$$y^{-2} dy = \frac{1}{1-x} dx$$

$$\int y^{-2} dy = \int \frac{1}{1-x} dx$$

$$-y^{-1} = -\ln|1-x| + C_1$$

$$\frac{1}{y} = \ln|1-x| + C_2$$

$$y(x) = \frac{1}{\ln|1-x| + C}$$