

Name: _____

Quiz 1, Section 2.2, due on Tue 20 May

(10 pts) Solve the differential equation $\frac{dy}{dx} + 2xy^2 = 0$ with initial condition $y(1) = 3$ using separation of variables.

Do this:

$$\frac{dy}{dx} = -2xy^2 \quad (1)$$

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

$$\text{integrate} = \text{integrate} \quad (3)$$

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

$$\frac{1}{y} = x^2 - c \quad (5)$$

$$y = \frac{1}{x^2 - c} \quad (6)$$

Now apply the initial condition to find c :

$$3 = \frac{1}{1^2 - c} \quad (7)$$

$$3 - 3c = 1 \quad (8)$$

$$-3c = -2 \quad (9)$$

$$c = \frac{2}{3} \quad (10)$$

The final solution is $y = \frac{1}{x^2 - \frac{2}{3}}$.