

Name: \_\_\_\_\_

Section: \_\_\_\_\_

**MA 114 QUIZ #9**

November 13, 2014

The following quiz is worth 4 points. Each problem will be worth 2 points. Be sure to read the problem carefully and answer every part of the problem. Be sure to show all of your work. Answers without support will not receive any credit.

1. Verify that  $y = 25e^{-2x^2}$  is a solution to the differential equation

$$y' + 4xy = 0.$$

We have

$$y' = -100xe^{-2x^2} = -4x(25e^{-2x^2}) = -4xy,$$

so that

$$y' + 4xy = -4xy + 4xy = 0.$$

Give them 1 point for the derivative and one point for the correct substitutions.

2. Solve the following initial value problem using separation of variables.

$$\begin{cases} y' + 2y = 0 \\ y(0) = 3 \end{cases}$$

An equivalent equation is  $\frac{dy}{dt} = -2y$ . Separating variables then gives

$$\begin{aligned} \int \frac{1}{y} dy &= \int -2 dt \\ \ln |y| &= -2t + C \\ |y| &= e^{-2t+C} = Ce^{-2t} \\ y &= \pm Ce^{-2t} = Ce^{-2t} \end{aligned}$$

Applying the initial condition we have

$$y(0) = C = 3,$$

so that  $C = 3$ . The solution is thus

$$y = 3e^{-2t}.$$

Give them 1.5 points for the general solution (you people do give half points, right?:)), and .5 points for determining C.