Name: _____
Section: _____

Math 46: Quiz 2
January 29, 2015

Please show all work and solve the following problems.

1. Solve the following differential equation

$$dx - \frac{1}{1+y^2}dy = 0$$

This ODE is separable, so we have

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

2. Is the following differential equation homogeneous? (*Note: You do not need to solve the ODE, just show if it homogeneous or not.*)

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

We make the substitution $y = ty$ and $y = tx$ to get:

$$\begin{aligned} y' &= \frac{2y+x}{x} \\ &= \frac{2ty+tx}{tx} \\ &= \frac{t(2y+x)}{tx} \\ &= \frac{2y+x}{x} \end{aligned}$$

So we have that the ODE is homogeneous.