Name: _____

Section: _____

Math 46: Quiz 6
March 5, 2015

Please show all work and solve the following problems.

1. Solve the following ODEs:

   (a) $y'' + 5y' + 6y = 0$
   (b) $y'' + 4y' + 4y = 0$
   (c) $y'' + y = 0$

   Solution: (a) Using the charateristic equation:

   $$\lambda^2 + 5\lambda + 6 = 0$$
   $$(\lambda + 3)(\lambda + 2) = 0$$
   $$\lambda = -3, \lambda = -2$$
   $$y(x) = c_1 e^{-3x} + c_2 e^{-2x}$$

   (b) Using the charateristic equation:

   $$\lambda^2 + 4\lambda + 4 = 0$$
   $$(\lambda + 2)(\lambda + 2) = 0$$
   $$\lambda = -2, \lambda = -2$$
   $$y(x) = c_1 e^{-2x} + c_2 x e^{-2x}$$

   (c) Using the charateristic equation:

   $$\lambda^2 + 1 = 0$$
   $$\lambda = \pm\sqrt{-1}$$
   $$\lambda = \pm i$$
   $$y(x) = c_1 \cos(x) + c_2 \sin(x)$$

   $\square$