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 characteristic 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 characteristic equation:

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

(c) Using the characteristic equation:

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