Homework Assignment 6 in MATH 308-Spring 2015
due February 20, 2015

Topics covered : *complex numbers; linear homogeneous equations of second order with constant coefficient: the cases of complex roots and repeated roots (section 3.3, section 3.4)*

1. Write the given expressions in the form $a + ib$:
   (a) $(2 - 3i)(3 + 5i)$
   (b) $\frac{1+2i}{2+i}$
   (c) $e^{\frac{5\pi}{6}i}$;
   (d) $e^{(-2-\frac{7\pi}{4}i)}$.

2. Consider the differential equation $5y'' + 8y' + 5y = 0$.
   (a) Find the general solution of this equation;
   (b) Find the solution of the equation with the initial conditions $y(\frac{5\pi}{6}) = -2$, $y'(\frac{5\pi}{6}) = -4$. Describe the behavior of the solution as $t \to +\infty$.

3. Consider the differential equation $4y'' - 20y' + 25y = 0$.
   (a) Find the general solution of this equation;
   (b) Find the solution of this equation satisfying the initial conditions $y(0) = \alpha$, $y'(0) = 3$;
   (c) For the solutions obtained in the previous item find the values of α , if any, for which the solutions tends to $+\infty$ as $t \to +\infty$ and the values of α, if any, for which the solutions tend to $-\infty$ as $t \to +\infty$.