Homework Assignment 1 – Review of Complex Numbers

1) For $z = x + iy$, Show that $zz^* = |z|^2$

2) Find the values of the following expressions.
Write the solutions in rectangular and polar form.
Check your answers using Matlab.

   a. $(2-i)-(1-i2)$

   b. $\left(\sqrt{2}-i\right)-i\left(1-i\sqrt{2}\right)$

   c. $(2-i3)(-2+i)$

   d. $(3+i)(3-i)\left(\frac{1}{5}+i\frac{1}{10}\right)$

   e. $\frac{1+i2}{3-i4}+\frac{2-i}{5i}$

   f. $\frac{5}{(1-i)(2-i)(3-i)}$

   g. $(1-i)^4$

3) Use Euler's formula to write $2e^{i\pi/4}$ in rectangular form.

4) Write $8\left(\cos(\pi/3)+i\sin(\pi/6)\right)$ in polar form. What is the phase?

5) Find: $\left(\cos(\pi/3)+i\sin(\pi/3)\right)^2$

6) Find the values for: $\sqrt[3]{i}$

7) Find the values for: $\sqrt[3]{1+i}$

8) What are the solutions to $(1)^{1/4}$?
Plot these on an Argand diagram.

9) Write the following expression in rectangular form: $(x+1+i3)(x-1+i2)^*$

10) Find the value of $e^{ix}(\cos x - i\sin x)$