Homework Set 2

Just as a reminder, on all homeworks this semester, please show your work and explain your reasoning. I will grade for clarity of explanation as much as I do for mere "correctness of final answer"!

Problems to work but not turn in.

1)   For the following complex numbers, find x, y, r, and θ, and plot the number and it's complex conjugate.

   (a) $z = 2i - 2$

   (b) $z = \sqrt{2}e^{-i\frac{\rho}{4}}$

2)   Simplify the complex number $z = \dfrac{3i - 7}{i + 4}$, find x, y, r, and θ, and plot the number in the complex plane.

3)   Find the absolute value of the following complex numbers.

   (a) $z = \dfrac{2i - 1}{i - 2}$

   (b) $z = \left(\dfrac{1+i}{1-i}\right)^5$

4)   Express the following complex numbers in the $x + iy$ form, using a sketch if necessary.

   (a) $z = 9e^{i\frac{3\rho}{2}}$

   (b) $z = \left(1 - i\right)^8$

Problems to turn in.

1)   Simplify the following complex numbers, find x, y, r, and θ, and plot the number in the complex plane.

   (a) $z = \dfrac{1}{1+i}$

   (b) $z = \left(i + \sqrt{3}\right)^2$

2)   Find the absolute value of the complex number $z = \dfrac{2 + 3i}{1 - i}$.

3)   Solve for all possible values of the real numbers x and y in the equation $\dfrac{x+iy}{x-iy} = -i$.

4)   Describe geometrically the set of points in the complex plane satisfying each of the following equations.

(a) $\left|z-1\right| < 1$

(b) $\left|z+3i\right| = 4$

5)   Express the following complex numbers in the $x+iy$ form, using a sketch if necessary.

(a) $z = \left(1+i\sqrt{3}\right)^{6}$

(b) $z = \left(\dfrac{1-i}{\sqrt{2}}\right)^{42}$

6)   Evaluate the following functions in $x+iy$ form.

(a) $z = \ln\left(i-1\right)$

(b) $z = \left(-1\right)^{i}$

(c) $z = \left(\dfrac{1}{2}+i\dfrac{\sqrt{3}}{2}\right)^{i}$