MAT 220, Vector Geometry and Algebra Name _____

Homework 1

Score_____

1. Reduce the expression $(x-1-i)(x-1+i)(x+1+i)(x+1-i)$ into the form $A+iB$.

2. Find real numbers x and y such that $(1+2i)x+(3-5i)y=1-3i$.

3. Find a complex number z such that $(3-4i)z=1-3i$.

4. Prove that $\left|\dfrac{z}{w}\right|=\dfrac{|z|}{|w|}$ for any complex numbers z and w with $w\neq 0$.

5. Given the system of equations

$$\begin{cases}(2+i)x+(2-i)y &= 6\\ (3+2i)x+(3-2i)y &= 8.\end{cases}$$

(a) Find all its real solutions. (b) Find all its complex solutions.

6. Evaluate

(a) $\left(-\dfrac{1}{2}+\dfrac{i\sqrt{3}}{2}\right)^2$, (b) $\left(-\dfrac{1}{2}+\dfrac{i\sqrt{3}}{2}\right)^3$.

7. Describe the set of point which correspond to the complex numbers z satisfying the inequalities:
(a) $|z|<2$, (b) $|z-i|\leq 1$.
Show these sets on pictures.

8. Show on a picture the set of points which correspond to the complex numbers z satisfying the following system of inequalities:

$$\begin{cases}1\leq z\cdot\overline{z}\leq 2\\ -\sqrt{3}\leq \operatorname{Im} z\leq 0.\end{cases}$$