Foundation Algebra for Physical Sciences and Engineering (CELEN036)

Homework 9

1. Solve the equations:

a. $x^2 + 9 = 0$ b. $9x^2 + 25 = 0$ c. $x^2 + 2x + 2 = 0$

2. Write the following expressions in the Cartesian form $x + iy$, $(x, y \in \mathbb{R})$.

a. $(3 + 2i) + (2 + 4i)$ b. $(4 + 3i) - (2 + 5i)$ c. $(4 + 3i) + (4 - 3i)$

3. Write the following fractions in the form $x + iy$, $(x, y \in \mathbb{R})$.

a. $\dfrac{2 + 3i}{1 + i}$ b. $\dfrac{-4 + 3i}{-2 - i}$ c. $\dfrac{4i}{2 - i}$

4. Simplify the following expressions and write in the form $x + iy$, $(x, y \in \mathbb{R})$.

a. $\dfrac{(2 + i)(3 - 2i)}{1 + i}$ b. $\dfrac{(1 - i)^3}{(2 + i)^2}$ c. $\dfrac{1}{3 + i} - \dfrac{1}{3 - i}$

5. Solve for $z = x + iy$, $(x, y \in \mathbb{R})$ in the following expressions.

a. $z(2 + i) = 3 - 2i$ b. $(z + i)(1 - i) = 2 + 3i$ c. $\dfrac{1}{z} + \dfrac{1}{2 - i} = \dfrac{3}{1 + i}$

6. Write the following complex numbers in polar form $r(\cos\theta + i\sin\theta)$, $-\pi < \theta \leq \pi$.

a. $1 + i$ b. $-2 + i$

c. -5 d. $4i$

e. $3 + 4i$ f. $-3 - 4i$

g. $3 - 4i$ h. $-3 + 4i$