Solutions

Complex Number Exercises
CS 145 Images and Imagination
Spring 2010

1. Put in z standard form (a + b i):

   a. $z = 4 + \sqrt{9} = 7$

   b. $z = i^2 + i\sqrt{25} = -1 + 5\,i$

   c. $z = 254\, i^2 = -254$

   d. $z = i^7 = -i$

2. Convert from polar to standard form (Cartesian coordinates) in standard form

   a. $r = 4, \quad \theta = 25, \quad z = 3.63 + 1.69\,i$

   b. $r = 5, \quad \theta = 165 \quad z = -4.83 + 1.29i$

3. Compute the modulus (length) of

   a. $z = 3 + 4i, \qquad r = 5$

   b. $z = -2 + 1.6i, \quad r = 2.56$

4. What is the $\bar{z}$ = complex conjugate of each of the z values in problem 1

   a. $\bar{z} = 4 - 3\,i$

   b. $\bar{z} = -1 - 5\,i$

   c. $\bar{z} = -254$

   d. $\bar{z} = i$

5. Suppose $z_1 = (4 + 3\,i)$ and $z_2 = (-2 + 4\,i)$. Calculate the following, placing the result in standard form

   a. $z_1 + z_2 = 2 + 7\,i$

   b. $z_1 - z_2 = 6 - i$

   c. $2\,z_1 = 8 + 6i$

   d. $z_1 z_1 = z_1^2 = 7.0 + 24.0i$

   e. $z_1 z_2 = -20 + 10\,i$

   f. $\bar{z}_1 + z_1 = 8$

   g. $\bar{z}_1 z_1 = 25$

   h. $z_1 / z_2 = .2 - 1.1\,i$