

# CHAPTER REVIEW

## Chapter 11: Polar Coordinates and Complex Numbers

### QUICK CHECK

Chapter 11

Complete these exercises before trying the Practice Test for Chapter 11. If you have difficulty with a particular problem, review the indicated section.

1. Give the rectangular coordinates for the point  $(8, -45^\circ)$ . (Section 11-1)
2. Describe how to sketch the polar graph of a polar equation without using a graphing calculator. (Section 11-1)
3. Express  $-2i$  and  $-1 - i$  in polar form. Find their product in rectangular form and in polar form. (Section 11-2)
4. If  $z = -1 - i$ , find  $z^4$  in polar form and in rectangular form. Then show  $z$  and  $z^4$  in an Argand diagram. (Section 11-3)
5. Express  $4i$  in polar form. Then find the two square roots of  $4i$ . Square each one to verify that it is a square root of  $4i$ . (Section 11-6)

### PRACTICE TEST

Chapter 11

Give polar coordinates  $(r, \theta)$ , where  $\theta$  is in degrees, for each point.

1.  $(0, 2)$
2.  $(6, -6)$
3.  $(-4, 3)$

Give the rectangular coordinates for each point.

4.  $(4, 135^\circ)$
5.  $(8, \frac{7\pi}{6})$
6.  $(10, 310^\circ)$

Sketch the polar graph of each equation. Use radian measure for  $\theta$ .

7.  $r = 1 + 2 \sin \theta$
8.  $r = 2 + \sin \theta$
9.  $r = \cos 2\theta$
10.  $r = \frac{\theta}{2}$

Let  $z_1 = 1 + i$ ,  $z_2 = -1 - i\sqrt{3}$ , and  $z_3 = \frac{3}{5} - \frac{4}{5}i$ .

11. Find  $|z_1|$ .
12. Express  $z_1$  in polar form.
13. Express  $z_2$  in polar form.
14. Find  $z_1 z_2$  in polar form.
15. Express  $(z_3)^{10}$  in rectangular form.
16. Find the three cube roots of  $z_3$ .

Let  $z_1 = \sqrt{3} - i$ ,  $z_2 = 2i$ , and  $z_3 = -\sqrt{3} - i$ .

17. Show  $z_1$ ,  $z_2$ , and  $z_3$  in an Argand diagram.
18. On the Argand diagram for Exercise 17, include the graph of the circle  $|z| = 2$ .
19. Explain how  $z_1$ ,  $z_2$ , and  $z_3$  are related to the circle  $|z| = 2$ .

### MIXED REVIEW

Chapters 1-11

Let  $f(x) = -2x + 1$  and  $g(x) = x^2 + 2x$ .

1. Give the domain, range, and zeros of  $g$ .
2. Find  $(g - f)(x)$ ,  $(f \circ g)(x)$ , and  $(g \circ f)(x)$ .
3. Find the inverse of  $f$  and then graph  $f$  and  $f^{-1}$ .
4. Find each point  $(x, y)$  that is on the graph of both functions.