HOMEWORK 10 - MATH 140 DUE DATE: Monday, April 25 INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. One part of each homework problem will be chosen at random and graded. Each question is worth 1 point. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. Convert the first two points from rectangular to polar and the second two from polar to rectangular coordinates:

(a)
$$(-3,3)$$
 (b) $(-2,-2\sqrt{3})$ (c) $(-2,\frac{3\pi}{4})$ (d) $(-1,-\frac{\pi}{3})$

2. Convert the following equations from rectangular to polar or from polar to rectangular as appropriate:

(a)
$$2x^2 + 2y^2 = 3$$
 (b) $4x^2y = 1$ (c) $r = \frac{3}{3 - \cos\theta}$ (d) $r = \sin\theta - \cos\theta$

3. Transform each polar equation to one in rectangular coordinates. Then identify and graph the equation:

(a)
$$r = 2\sin\theta$$
 (b) $r\sec\theta = -4$

4. Identify and graph each of the following polar equations: (Tell me what category it falls under and roughly sketch its graph showing a few points.)

(a) $r = 1 + \sin \theta$ (b) $r = 4 + 2\sin \theta$ (c) $r = 2\sin(3\theta)$ (d) $r = 3 + \cos \theta$.

5. Write the following complex numbers in polar form

(a)
$$2 + \sqrt{3}i$$
 (b) $4 - 4i$ (c) $9\sqrt{3} + 9i$

6. Write each of the following complex numbers in the standard form z = x + iy:

(a)
$$\left[2\left(\cos\left(\frac{\pi}{10}\right)+i\sin\left(\frac{\pi}{10}\right)\right)\right]^5$$
 (b) $\left[\sqrt{3}\left(\cos\left(\frac{5\pi}{18}\right)+i\sin\left(\frac{5\pi}{18}\right)\right)\right]^6$ (c) $(\sqrt{3}-i)^{12}$.

- 7. Compute all complex cube roots of -8 8i and all complex fifth roots of -i. Leave your answers in polar form.
- 8. (a) If the vector \vec{v} has initial point P = (-2, -1) and terminal point Q = (6, -2), find the position vector $\vec{v} = a\vec{i} + b\vec{j}$ corresponding to \vec{v} .
 - (b) If P = (-3, 1) and Q = (x, 4), find all numbers x, such that the vector represented by \vec{PQ} has length 5.