HOMEWORK 12 - MATH 140
DUE DATE: Monday, December 6
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. Transform into rectangular coordinates:

$$(a)\ r = 2 \quad (b)\ \theta = -\frac{\pi}{4} \quad (c)\ r\sin\theta = -2 \quad (d)\ r = -4\cos\theta$$

2. Use the different categories of polar graphs in your book to graph the following:

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

3. Plot in the plane and write in polar and in rectangular form the complex numbers

$$(a)\ -1 + i \quad (b)\ 2 + \sqrt{3}i \quad (c)\ 3(\cos 210° + i\sin 210°) \quad (d)\ 4(\cos\frac{\pi}{2} + i\sin\frac{\pi}{2})$$

4. Find zw and $\frac{z}{w}$, leaving your answers in polar form, for

$$z = 4(\cos\frac{3\pi}{8} + i\sin\frac{3\pi}{8}) \quad \text{and} \quad w = 2(\cos\frac{9\pi}{16} + i\sin\frac{9\pi}{16}).$$

5. Write each expression in the standard form $a + bi$:

$$(a)\ [\sqrt{3}(\cos 10° + i\sin 10°)]^6 \quad (b)\ [\frac{1}{2}(\cos 72° + i\sin 72°)]^5$$

6. Find the complex 4-th roots of $\sqrt{3} - i$.

7. ind the following:

   (a) $\mathbf{v}$ in the form $a\mathbf{i} + b\mathbf{j}$, where $\mathbf{v}$ has initial point $P = (-3, 2)$ and terminal point $Q = (6, 5)$. Make also a graph of the situation.

   (b) $||\mathbf{v}||$ if $\mathbf{v} = -5\mathbf{i} + 12\mathbf{j}$

   (c) $3\mathbf{v} - 2\mathbf{w}$, where $\mathbf{v} = 3\mathbf{i} - 5\mathbf{j}$ and $\mathbf{w} = -2\mathbf{i} + 3\mathbf{j}$

   (d) the unit vector having the same direction as $\mathbf{v} = 2\mathbf{i} - \mathbf{j}$

8. Write the vector $\mathbf{v}$ in the form $a\mathbf{i} + b\mathbf{j}$, if $||\mathbf{v}|| = 8$ and the angle α that it makes with the positive x-axis is $\alpha = 45°$.