Math 121 Review Problems for Chapter 9 Fall 2011

1. For the point $(r, \theta) = (3, \frac{2\pi}{3})$, plot the point and then find other polar cordinates (r, θ) of the point for which (a) $r > 0, -2\pi \leq \theta < 0$ (b) $r > 0, 0 \leq \theta < 2\pi$ (c) $r < 0, 2\pi \leq \theta < 4\pi$
2. Find the rectangular cordinates for each point. (a) $(6, \frac{4\pi}{3})$ (b) $(-3, -346^o)$
3. Find the polar coordinates for each point. (a) $(-7, 3)$ (b) $(-3.4, -2.6)$
4. Write the equation $x^2 = 2y$ using polar coordinates.
5. Write the equation $r = 8\cos\theta$ using rectangular coordinates.
6. Write each complex number in polar form. Use degrees. (a) $-9 + 9i$ (b) $4 - 4\sqrt{3}i$
7. Write each complex number in rectangular form.
   (a) $2(\cos 330^o + i \sin 330^o)$ (b)$0.3(\cos 240^o + i \sin 2340^o)$
8. Find $z \cdot w$ and z/w, and leave in polar form. $z = \cos 110^o + i \sin 110^o$, $w = \cos 10^o + i \sin 10^o$
9. Write $100(\cos 80^o + i \sin 80^o)$ in standard form $a + bi$.
10. Find all of the complex cube roots of -4.
11. Find the position vector $\vec{v}$ with initial point $P = (4, 9)$ and terminal point $(4, 6)$.
12. Find $3\vec{v} - 2\vec{w}$ if $\vec{v} = 3\vec{i} - 7\vec{j}$ and $\vec{w} = -5\vec{i} + 7\vec{j}$.
13. Find $||\vec{v}||$ if $\vec{v} = -7\vec{i} - 6\vec{j}$
14. Find the unit vector in the same direction as $\vec{v} = 7\vec{i} - 4\vec{j}$.
15. Find the vector $\vec{v}$ whose magnitude is 7 and whose component in the $\vec{i}$ direction is both positive and equal to the component in the $\vec{j}$.
16. Find the vector $\vec{v}$ given that the magnitude is 7 and the angle it makes with the ositive x-axis is $\alpha = 225^o$.
17. Use the vectors $\vec{v} = 4\vec{i} + 8\vec{j}$ and $\vec{w} = -8\vec{i} + 4\vec{j}$ to answer the folowing questions.
   (a) Find the dot product.
   (b) Find the angle (in degrees) between $\vec{v}$ and $\vec{w}$.
   (c) Determine whether the vectors are parallel, orthogonal, or neither.
18. Determine b so that vectors $\vec{v} = 3\vec{i} + \vec{j}$ and $\vec{w} = \vec{i} + b\vec{j}$ are orthogonal.
19. Use the vectors $\vec{v} = -7\vec{i} + 9\vec{j}$ and $\vec{w} = 5\vec{i} + 2\vec{j}$ to decompose $\vec{v}$ into two vectors $\vec{v_1}$ and $\vec{v_2}$, where $\vec{v_1}$ is parallel to $\vec{w}$ and $\vec{v_2}$ is orthogonal to $\vec{w}$.
20. Find the distance from $P_1(1, 2, 3)$ to $P_2(4, 5, 6)$.
21. Find the position vector for $P(2, -1, 3)$ and $Q(0, 3, -4)$
22. If $\vec{v} = 6\vec{i} + 2\vec{j} + 3\vec{k}$ and $\vec{w} = -\vec{i} + 5\vec{j} - 2\vec{k}$ find:
   (a) $||\vec{v}||$ (b) $\vec{v} + \vec{w}$ (c) $\vec{v} - \vec{w}$ (d) $2\vec{v}$ (e) $2\vec{v} + 4\vec{w}$
23. Find the dot product for $\vec{v} = \vec{i} - 2\vec{j} + 3\vec{k}$ and $\vec{w} = 5\vec{i} + 9\vec{k}$
24. find the angle between $\vec{v} = \vec{i} + 2\vec{j} + 3\vec{k}$ and $\vec{w} = 4\vec{i} - \vec{k}$