Beverly Hills High School -- Honors Math Analysis -- Test #3 -- 80 points

As usual, show all of your work. Partial credit for partial achievement. Pencils only. Calculators okay.

1) Given these vectors, analytically determine the magnitude and direction of $2\vec{A} - 3\vec{B}$. Ten points.

$\vec{A} = 70$ m/s @20°
$\vec{B} = 40$ m/s @ 60°

2) Given these vectors, execute the following operations: $\vec{A} = -3\hat{i} + 5\hat{j}$ $\vec{B} = 8\hat{i} - 6\hat{j}$ $\vec{C} = 7\hat{i} + 6\hat{j}$

a) $2\vec{A} - \vec{B} + \vec{C}$ b) $\vec{A} \cdot \vec{B} - \vec{B} \cdot \vec{C}$ c) $\|\vec{B}\|$

3) Eliminate the parameter and determine what figure is presented in each:

a) $x = 2 \cos 3t, y = 2 \sin 3t$ b) $x = 2t - 3, y = x^2 + 1$

4) Using DeMoivre's Theorem, determine each of the following completely (only use calculator to verify!):

a) $(2 + 2i\sqrt{3})^3$

b) $\sqrt[6]{(\sqrt{3} - i)}$

5) Find the angle between the vectors <6, -9> and <3, 2>.

6) For two points apiece, give an example of each of these figures, strictly using polar coordinates:

a) a circle of radius 6 _____

b) a rose with 12 leaves _____

c) a lemniscate _____

7) For four points, convert this hyperbolic equation to polar coordinates and solve for r^2:

$$\frac{x^2}{9} - \frac{y^2}{4} = 1$$

8) Write the following polar equation in rectangular coordinates and determine what it is:

$$r = \frac{3}{\sin\theta - 2\cos\theta}$$

9) Find a correct parameterization for the straight line going thru the points (-4, 7) and (5, -1).

10) Determine the distance between the polar coordinate points $(12, \frac{4\pi}{3})$ and $(8, \frac{\pi}{6})$

11) What is the unit vector in the same direction as $\vec{v} = -16\hat{i} + 30\hat{j}$

12) Show how we derived the formula for the angle between two vectors from the Law of Cosines. Five pts.