Pre-Calculus Homework #20

1) Graph the following points on a polar graph:

A) $(5, \frac{-7\pi}{9})$ B) $(-4, -1320°)$ C) $(0, \frac{13\pi}{6})$ D) $(-3, 330°)$ E) $(-2, \frac{-39\pi}{4})$

2) Find the polar coordinates of the point $(\frac{-5\sqrt{3}}{2}, \frac{-5}{2})$ twice, first in degrees and then again in radians, using the smallest possible positive angle.

3) Find the rectangular coordinates of the point $(-7, 600°)$.

4) Convert $r = 5\sin 4\theta$ to a rectangular equation.

5) Graph the equation $r = 10\sin 4\theta$ for $0 \le \theta \le 2\pi$ **Hint: You might want to plot points in 5 degree intervals to see a clear and accurate graph**

6) If $u = \langle -3, 5 \rangle$ and $v = \langle 4, -7 \rangle$, find $5u - 4v$

7) If $u = \langle 7, -6 \rangle$ and $v = \langle -8, 1 \rangle$, find $-5|3u| - 2v|$

8) If $u = \langle 6, -2 \rangle$ and $v = \langle -8, -3 \rangle$ and $w = \langle -5, 9 \rangle$, find $4u - 3w(2|u| - 6|v|)$

9) If $u = \langle -13, -7 \rangle$ and $v = \langle 12, 10 \rangle$ and $w = \langle -4, -11 \rangle$, find $v \bullet u - w \bullet v$

10) Find a unit vector that has the same direction as the vector $-2i + 5j$.

11) Find a unit vector that has the same direction as the vector $5\langle 8, -5 \rangle - 3\langle -4, 2 \rangle$.

12) Determine the magnitude and direction angle, rounded to two decimal places, for the vector $\langle 9, -12 \rangle$.

13) Determine the magnitude and direction angle, rounded to one decimal place, for the vector $3(8i - 9j) - 4(3i + 7j)$.

14) If $|u| = 37$ and $|v| = 23$ and the angle in between the vectors, θ, equals $136°$, find, rounded to two decimal places, the magnitude and direction of the vector $u + v$.

15) If $|u|=12$ and $|v|=19$ and the angle in between the vectors, θ, equals $57°$, find, rounded to two decimal places, the magnitude and direction of the vector $u+v$.

16) Use vector addition to solve the following problem. A ship leaves a port and sails at a bearing of $S\,68°\,W$ for 156 nautical miles. It then turns and sails for another 241 nautical miles at a bearing of $N\,37°\,E$. Rounded to two decimal places, how far is the ship from the port and at what bearing?

17) Use vector addition to solve the following problem. An airplane takes off from an airport and flies at a bearing of $231°$ for 564 miles. It then turns and flies for another 749 miles at a bearing of $318°$. Rounded to two decimal places, how far is the airplane from the airport and at what bearing?

18) Rounded to one decimal place, find the angle between the vectors $4i+9j$ and $-3i+7j$.

19) Use vector addition and the $i+j$ component form to solve the following problem. A motorboat's engine propels the boat with a 230 pound force in a direction of $S\,38°\,E$. A current in the water coming from $N\,24°\,E$ exerts a 97 pound force on the boat. Rounded to two decimal places, what is the magnitude of the resultant force and in what direction is the boat actually moving?

20) Use vector subtraction and the $i+j$ component form to solve the following problem. An airplane takes off from an airport with a groundspeed of 279 mph and needs to land at an airport bearing $314°$. If there is a constant 58 mph wind blowing from $148°$, what is the airspeed of the airplane and in what direction will the pilot have to actually fly the plane, rounded to two decimal places, in order to land at the appropriate airport?