Pre-Calculus Homework #21

1) If $u = \langle -4, 6 \rangle$ and $v = \langle 7, -2 \rangle$ and $w = \langle -4, -8 \rangle$, find $-3u(4|w| + 5|u|) - 7v$

2) If $u = \langle -10, -11 \rangle$ and $v = \langle 12, 4 \rangle$ and $w = \langle -19, -6 \rangle$, find $w \bullet v + u \bullet w$

3) Find a unit vector that has the same direction as the vector $9i - 13j$.

4) Use vector addition and the $i + j$ component form to solve the following problem. A motorboat's engine propels the boat with a 176 pound force in a direction of $N54°W$. A current in the water coming from $S38°W$ exerts an 85 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?

5) 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 196 mph and needs to land at an airport bearing $231°$. If there is a constant 34 mph wind blowing from $317°$, 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?

6) Determine if the sequence 95, 78, 61, 44,… is arithmetic or geometric. Find an equation that models this sequence. Find the 23rd term and determine which term the number -908 represents.

7) Determine if the sequence $\dfrac{5}{243}, \dfrac{5}{81}, \dfrac{5}{27}, \dfrac{5}{9}, ...$ is arithmetic or geometric. Find an equation that models this sequence. Find the 17th term and determine which term the number 10,935 represents.

8) Evaluate: $\displaystyle\sum_{k=1}^{49} -3k + 5$

9) Evaluate: $\displaystyle\sum_{k=1}^{\infty} 6(\frac{3}{4})^k$

10) There are 18 seats in the first row of seats in an auditorium and each row behind that row contains 5 more seats than the previous row. If there are 37 rows of seats in this auditorium, determine the total number of seats.

11) Determine if the sequence 729, 486, 324, 216,… is arithmetic or geometric. Find an equation that models this sequence. Find the 13th term and determine which term the number $\dfrac{65536}{59049}$ represents.

12) Determine if the sequence –597, –539, –481, –423,… is arithmetic or geometric. Find an equation that models this sequence. Find the 41st term and determine which term the number 3,115 represents.

13) Evaluate: $\displaystyle\sum_{k=0}^{74} \frac{5}{7}k - 8$

14) Evaluate: $\displaystyle\sum_{k=0}^{57} -4(\frac{5}{3})^k$ (Write your final answer in scientific notation rounded to 6 places)

15) If a rubber ball is dropped from a height of twelve feet and bounces straight back up to half of its initial height before falling back to the ground again and then repeats this pattern of bouncing up to half of its previous height and falling back down again forever, how far will the ball travel, in feet, exactly?

16) Emily's mother decides to give her a cash birthday present every year, starting on her first birthday. If she decides to make the first present worth $45 and increases the dollar amount of the present by $7 every year, how much total money will Emily have received just after her 21st birthday?

17) Determine if the sequence -786432, 393216, -196608, 98304,… is arithmetic or geometric. Find an equation that models this sequence. Find the 31st term and determine which term the number $\dfrac{3}{32}$ represents.

18) Evaluate: $\displaystyle\sum_{k=1}^{\infty} \frac{-3}{8}k + 9$

19) Evaluate: $\displaystyle\sum_{k=0}^{\infty} -(\frac{-7}{9})^k$

20) If a rubber ball is dropped from a height of seven feet and bounces straight back up to five eighths of its initial height before falling back to the ground again and then repeats this pattern of bouncing up to five eighths of its previous height and falling back down again for exactly twenty bounces and then you grab it as it reaches its maximum height after the twentieth bounce, how far will the ball travel, in feet, rounded to four decimal places?