Beverly Hills High School -- Honors Math Analysis -- Test #4 -- Chapter 9 -- 90 points

SHOW ALL YOUR WORK. Please be clear and organized in your problem solutions. Partial credit for partial achievement. Five points apiece unless specified. Pencils only. Calculators okay but show work if you want full credit.

1) Wayne Gretzky, probably the greatest pro hockey player ever, scored goals on 32.5% of his shots. What is the probability he will score exactly 2 goals in 7 shots in the first game and 4 goals in 8 shots in the second game of a weekend doubleheader of games?

2) There are 25 women on the roster of the US Olympic softball team. Given that every woman can play any of the positions, how many possible 10-woman lineups can their manager create on opening day?

3) Consider the word "CHATTANOOGA." How many distinct eight-letter "words" can be formed from it?

4) Drawing a random card from a standard 52-card deck of cards, what is the probability of drawing a face card or a diamond?

5) What's the coefficient of the x^8 term in the expression $(3k - 5x^2)^{11}$?

6) Use the Binomial Theorem to find the polynomial expression equivalent to $(x + 2\sqrt{y})^5$.

7) In a bag there are 8 red marbles, 6 green marbles, and 4 blue marbles. What is the probability of choosing a red one, followed by a green one, followed by a blue one, followed by another red one if none are replaced?

8) Easy ten points on this one. Let us say that at Beverly High, 75% of the students have cell phones (probably closer to 100%, huh?). Let us say that 30% have laptops. 15% of the students have both.

a) Create a Venn diagram at the right to determine what percent of the students have neither. Label it too.

b) If there are 1500 students at Beverly, how many have a cell phone and not a laptop?

9) Drinking a first cup of coffee in the morning raises one's alertness to 1.75 times what it was before coffee. Each succeeding cup is only 84% as effective as the one before it. Write an explicit expression for A_c (alertness as a function of cups), <u>and</u> state how many percent the fourth cup raises one's alertness.

10) Consider the sequence $\frac{3}{7}, \frac{-4}{8}, \frac{5}{9}, \frac{-6}{10}, \frac{7}{11}, \ldots$ Write a recursive rule for this sequence below.

11) Ten points for this trio of problems. Determine whether the terms or sums shown converge or diverge as n grows to infinity. If they converge, state to what value they converge.

a) $a_n = \dfrac{3x^2 - 11x + 83}{14 - 2x^2}$ b) $a_n = \dfrac{2n}{747}$ c) $\displaystyle\sum_{n=1}^{\infty} \frac{3}{2^{n-4}}$

12) Write this series in SIGMA notation, using n as your index of summation: 48 - 24 + 12 - 6 + 3 -...
Then evaluate its sum if n goes to infinity.

13) The 3rd and 5th terms of a geometric sequence are 24.5 and 1200.5, respectively. Write an explicit rule for this sequence.

14) Convert the repeating decimal, 0.478787878... to a properly reduced fraction.

15) Prove inductively that 2 is a factor of (n + 1)(n + 2) for all positive integers n.

16) Prove inductively that 8 is a factor of 9^n - 1 for all all positive integers n.

SCRATCH AREA (If you want me to look here, say so.)