Pre-Calculus

Instructions: Welcome to the Pre-calculus test. You will have 50 minutes to complete this test. NO calculators allowed. Good luck!

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

1. Find the smallest integer k for which $(\log_6 11)(\log_{11} 16)(\log_{16} 21)\ .\ .\ .\ (\log_{5k+1}(5k+6))$ is an integer.

2. There are six fish in a pond, three of which are tagged. If a man catches three fish, selected at random without replacement, the probability that exactly two tagged fish are caught is?

3. A company places a little prize in each bag of chips. There are four different types of prizes that are distributed evenly across the bags. What is the average number of bags you would need to buy before you have collected a complete set?

4. Jonas begins flipping a coin repeatedly and recording the outcome. What is the probability that he will get three consecutive heads before he ever gets three consecutive tails?

5. $\sum_{i=1}^{\infty}(1/(16i^2+8i-3)) =$

6. Find the least positive integer such that when its leftmost digit is deleted, the resulting integer is $\frac{1}{21}$ of the number.

7. $\log_{6cosx} 6sinx = \frac{2}{3}$. Find 9tan(2x).

8. $cos36^\circ - cos72^\circ =$

9. Three numbers are chosen between 0 and 1. What is the probability the difference between the greatest and least is less than $\frac{1}{4}$?

10. Consider the polynomial $3x^5 - x^4 + 2x^3 + x^2 - 5$. If r_1, r_2, r_3, r_4, and r_5 are its roots, find $r_1^2 + r_2^2 + r_3^2 + r_4^2 + r_5^2$