Name: ___________________________

Panther ID: ___________________________

Spring 2014

MAC 1140 - Precalculus Algebra

Test # 5

There are 12 problems for a total of 110 points. **Show your work;** an answer alone, even correct, will get no credit. An illegible answer will not be graded, so write your work neatly. Organize your work, so it is clear what you do and why. It might be necessary to use English sentences to write explanations.

Problem 1. (8 pts) Write down the first five terms of the sequence defined recursively as

$a_1 = -4$

$a_n = n + 2a_{n-1}$, $n > 1$

Problem 2. (8 pts) Write out the sum. Do not evaluate!

$$\sum_{k=2}^{8} (-1)^k \ln k$$

Problem 3. (10 pts) Find the coefficient of x^{10} in the expansion of $(2x + 3)^{13}$. You **must** compute the binomial coefficient, but you can leave any exponents in exponential form.

Problem 4. (9 pts) Determine whether the sequence $\left\{2+\frac{3}{n}\right\}$ is arithmetic. If it is, find the first term and the common difference.

Problem 5. (10 pts) Find the first term and the common difference of the arithmetic sequence whose 12^{th} term is 4 and the 18^{th} term is 28. Write the formula for the general term of this sequence. Make sure to simplify the answer.

Problem 6. (9 pts) Write the sum of the first 1000 terms of an arithmetic sequence whose first term is 3 and the common difference is -2 in sigma notation and compute its value

Problem 7. (9 pts) Find the 10^{th} term of the geometric sequence -1, 2, -4, …. Write the formula for the n-th term of this sequence.

Problem 8 (9 pts) Find the sum of the first 15 terms of the geometric sequence with the first term 2 and the common ratio 5. Do not evaluate exponents.

Problem 9. (10 pts) Determine whether the series $\sum_{k=1}^{\infty} \frac{2^k}{5^{k-1}}$ converges. Explain! If it converges, find its sum.

Problem 10. (10 pts) Use the Binomial Theorem to expand $(2x+1)^5$

Problem 11. (8 pts) Express the sum using sigma notation. Do not evaluate!

$$\frac{1}{e}+\frac{2}{e^2}+\frac{3}{e^3}+\cdots+\frac{125}{e^{125}}$$

Problem 12. (10 pts) Use mathematical induction to show that

$$1\cdot 2+2\cdot 3+3\cdot 4+\cdots+n(n+1)=\frac{1}{3}n(n+1)(n+2)$$