NAME:______________________________ Date: 05/28/2009 MATH 104: Precalculus Spring 2009 Tigran Mkrtchyan **TEST 5**

YOU MUST SHOW ALL OF YOUR WORK to receive full credit for the problem. The more work you show on your paper leading to your solution will give me more opportunity to award partial credit. Clearly indicate your solution to the problem.

1) Find a 3-rd degree polynomial so that 3 is a zero, – 1 is a double zero (zero of multiplicity two) and the graph passes through the point (2, - 3).

2) *(4 points)* Given $x^3 - \frac{1}{2}x^2 - \frac{9}{2}x - 2 = 0$.

(a) List all possible rational zeros

(b) Use Descartes's Rule of Signs to determine the number of positive and negative roots.

(c) Solve the equation.

3) *(4 points)* Solve the equation $x^2 - 14x + 53 = 0$ given that 7-2i is a root.

4) Determine A and B so that the equation is an identity. $\frac{5x+27}{(x+3)(x-3)} = \frac{A}{x+3} + \frac{B}{x-3}$

5) Use mathematical induction to prove that the statement is true for all natural numbers n.
$2+4+6+ \ldots +2n = n(n+1)$

6) Expand $(3x^2-y)^5$

7) Find the coefficient of the 15^{th} term of the expansion of $(a-b)^{30}$.

8) Given the sequence 7, 10, 13, 16, …
   (a) Find the 200^{th} term.

   (b) Find the sum of the first 15 terms of the given sequence $\sum_{i=1}^{15} a_i$

9) Given the sequence $\frac{1}{2}, -\frac{1}{4}, \frac{1}{8}, -\frac{1}{16}, \ldots$

(a) Determine if the sequence is arithmetic or geometric. If arithmetic find the common difference, if geometric find the common ratio.

(b) Find the sum of the infinite series $S = \sum_{i=1}^{\infty} a_i = \frac{1}{2} + \left(-\frac{1}{4}\right) + \frac{1}{8} + \left(-\frac{1}{16}\right) + \ldots$