Math 3012 A1
Test 1
September 14, 2001

Partial credit will be considered and answers without explanation are not acceptable.

1. (5) Find the coefficient of x^5y^{20} in the expansion of $\left(2 + 3x + 5y^2\right)^{100}$.

2. (5) Use induction to prove that $1^3 + 2^3 + \cdots + n^3 = \left(\frac{n(n+1)}{2}\right)^2$ for $n \geq 1$.

3. (5) Find the number of non-negative integer solutions to the equation $x_1 + \cdots + x_{10} < 101$.

4. (5) Find the number of five letter "words" which can be formed by using letters from one A, one B, one C, one D, one E, and five Fs.

5. (5) (a) Use Euclidean algorithm to find *gcd*(1024,28). (b) Find integers *s* and *t* such that *gcd*(1024,28) = 1024*s* + 28*t*.

6. (5) Let *A* and *B* be two sets with $|A| = 999$ and $|B| = 1000$. Let *R* be a relation from *A* to *B* such that $|R| = 1000$ Show that *R* is not a function from *A* to *B*.