MATH 1200 (SECTION E): MATHEMATICAL INDUCTION

1. Use Mathematical Induction to prove that

$$1^2 + 2^2 + 3^2 + \cdots + n^2 = \frac{n(n+1)(2n+1)}{6}.$$

2. Find a formula for the sum

$$\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \cdots + \frac{1}{n.(n+1)},$$

and use Mathematical Induction to prove your formula is correct.

3. Use Mathematical Induction to prove that $n^3 + 2n$ is a multiple of 3 for every positive integer n.

4. Use Mathematical Induction to prove that for all positive integers n, $2^n 3^{2n} - 1$ is a multiple of 17.

5. Use Mathematical Induction to prove that for all integers n,

$$1 + \frac{1}{4} + \frac{1}{9} + \cdots + \frac{1}{n^2} \leq 2 - \frac{1}{n}.$$