Math 2312 ***Homework*** *Sec*–2.3 ***Name***:

1. Prove that the statement is true: $1 \cdot 1! + 2 \cdot 2! + 3 \cdot 3! + \ldots + n \cdot n! = (n+1)! - 1$

2. Prove that the statement is true: $1^2 + 2^2 + 3^2 + \ldots + n^2 = \dfrac{n(n+1)(2n+1)}{6}$

3. Prove that the statement is true: $1 + 2 + 3 + \ldots + n + (n+1) = \dfrac{1}{2}(n+1)(n+2)$