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## Recitation 4 Worksheet

fall 2014

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Prove the following statements true using mathematical induction. Write your answers on a different sheet of paper and show all your work. When you are finished, come show me to get credit for today's lab.

1.  $\sum_{k=1}^n k = \frac{1}{2}n(n+1)$

2.  $1 + 3 + 5 + 7 + \dots + (2n - 1) = n^2$

3.  $2^n > n^2$  for all natural numbers  $\mathbb{N} \geq 5$

4.  $\sum_{k=1}^n k^2 = \frac{1}{6}n(n+1)(2n+1)$

5. Prove the following program computes  $n * m$

```
multi(n : integer  $\geq 1$ , m : integer  $\geq 1$ ) :  
    if (n = 1);  
        return m;  
    else  
        return m + multi(n - 1, m);
```

6. Write all string less than length 7 in the language defined by:

```
<S> = <P> | <Q>  
<P> = ^ | <Q><P> | ^<P>  
<Q> = #! | #<Q>!
```