**8A Introduction to Proof by Induction**

1. Prove by mathematical induction that, for $n\in Z^{+}$

$$\sum\_{r=1}^{n}\left(2r-1\right)=n^{2}$$

1. Prove, by mathematical induction, that for $n\in Z^{+}$,

$$\sum\_{r=1}^{n}\left(r^{2}\right)=\frac{1}{6}n\left(n+1\right)\left(2n+1\right)$$

1. Prove, by mathematical induction, that for $n\in Z^{+}$,

$$\sum\_{r=1}^{n}\left(r2^{r}\right)=2\left[1+(n-1)2^{n}\right]$$