

HW3

Abdul-Ahmed Butt

$$1) \sum_{k=1}^n 2k-1 = n^2$$

a) for  $n=1$  we have  $(2k-1) = 2 \cdot 1 - 1 = 1$  ✓

$$(2k-1) + 2(n+1) - 1 = n^2 + 2n + 1 = (n+1)^2$$

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

a) for  $n=1$  we have  $\frac{n(n+1)}{2} = \frac{1(1+1)}{2} = \frac{1(2)}{2} = 1$  ✓

for  $n+1$  we have  $\frac{n+1(n+1+1)}{2} = \frac{(n+1)(n+2)}{2}$

$$3) \sum_{k=1}^n k^2 \rightarrow \frac{n(n+1)(2n+1)}{6}$$

for  $n=1$  we have  $\frac{1(1+1)(2(1)+1)}{6} = \frac{1(2)(3)}{6} = \frac{6}{6} = 1$  ✓

for  $n+1$  we have  $\frac{(n+1)((n+1)+1)(2(n+1)+1)}{6}$

$$4) \sum_{k=1}^n k^3 = \left( \frac{n(n+1)}{2} \right)^2$$

for  $n=1$  we have  $\left( \frac{1(1+1)}{2} \right)^2 = \left( \frac{1(2)}{2} \right)^2 = (1)^2 = 1 \checkmark$

for  $n+1$  we have  $\left( \frac{(n+1)((n+1)+1)}{2} \right)^2$