

## MATH 1210 Tutorial # 2

1. Prove that

$$\sum_{k=1}^n ((2k-1)\sqrt{3})^2 = n(4n^2 - 1)$$

for every positive integer  $n$ .

2. Decide whether or not the equalities

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

and

$$(b) \sum_{k=0}^n (k+1)^3 = \left( \sum_{k=0}^n (k+1) \right)^2$$

hold for all positive integers  $n$ .

3. Rewrite the sum

$$\sum_{r=12}^{122} \frac{r-6}{r+9}$$

using an index whose initial and terminal values are 1 and 111, respectively (HINT: use a change of variables).

4. Simplify

$$\frac{169}{5+12i} + \left( \overline{(1-2i)^3 + 4} \right)^2$$

and express in Cartesian form.

5. Given that  $i^2 = -1$ , show that

$$\sum_{k=0}^{4n} i^k = 1$$

for all integers  $n \geq 0$ .