Quickcheck 03: Analysis

Your friend used summations to make a model for the running time of one of their functions. Simplify their summations into a final (exact) closed form. Then determine what the big-$O$ of the function is.

$$\sum_{i=0}^{n-1}(6i^2-3) + \sum_{i=0}^{n-1}\frac{2^i}{n} + \sum_{i=0}^{n/2-1}\sum_{j=0}^{i-1}1$$

Here is a list of identities that may be useful:

**Manipulating Sums:**

$$\sum_{i=a}^{b}(x + y) = \sum_{i=a}^{b}x + \sum_{i=a}^{b}y$$

$$\sum_{i=a}^{b}f(i) = \sum_{i=0}^{b}f(i) - \sum_{i=0}^{a-1}f(i)$$

$$\sum_{i=a}^{b}c \cdot f(i) = c \sum_{i=a}^{b}f(i)$$

**Geometric Series Identities:**

$$\sum_{i=0}^{n-1}x^i = \frac{x^n - 1}{x - 1}$$

$$\sum_{i=0}^{\infty}x^i = \frac{1}{1-x} \text{ if } -1 < x < 1$$

**Other Common Summations:**

$$\sum_{i=0}^{n-1}i = \frac{n(n-1)}{2}$$

$$\sum_{i=0}^{n-1}i^2 = \frac{n(n-1)(2n-1)}{6}$$

$$\sum_{i=0}^{n-1}c = cn$$
Another question

Do you have any questions about this course? It could be about policy, content, instructors, TAs, etc.