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-$\mathcal{O}$ 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:

$$\sum_{i=a}^{b}(x+y)=\sum_{i=a}^{b}x+\sum_{i=a}^{b}y \qquad \sum_{i=a}^{b}f(i)=\sum_{i=0}^{b}f(i)-\sum_{i=0}^{a-1}f(i) \qquad \sum_{i=a}^{b}c\cdot f(i)=c\sum_{i=a}^{b}f(i)$$

Geometric Series Identities:

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

Other Common Summations:

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

Another question

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