Answer on Question #54434 - Math - Calculus

Use the properties of summation to evaluate the following:

$$\sum_{i=1}^{4}(i^2 - 3i).$$

Solution

We will need the following well-known summation rules.

1. $\sum_{i=1}^{n} i = 1 + 2 + 3 + \cdots + n = \frac{n(n+1)}{2}$.
2. $\sum_{i=1}^{n} i^2 = 1^2 + 2^2 + 3^2 + \cdots + n^2 = \frac{n(n+1)(2n+1)}{6}$.

$$\sum_{i=1}^{4}(i^2 - 3i) = (\text{separate this summation into two separate summations}) = \sum_{i=1}^{4} i^2 - \sum_{i=1}^{4} 3i =$$

$$= (\text{factor out the number 3 in the second summation}) = \sum_{i=1}^{4} i^2 - 3\sum_{i=1}^{4} i = (\text{apply rules 1 and 2}) =$$

$$= \frac{4(4+1)(8+1)}{6} - 3 \cdot \frac{4(4+1)}{2} = 30 - 30 = 0$$

Answer: 0.