■ Compute the following sums.

[1] $\sum_{k=1}^{n} (3k+2)$

[2] $\sum_{k=1}^{n-1} (3k+2)$

[3] $\sum_{k=1}^{n} (k+1)^2$

[4] $\sum_{k=1}^{n} (k+1)(k-1)$

[5] $\sum_{k=10}^{n} k$

[6] $\sum_{k=1}^{n-2} 3$

[7] $\sum_{k=1}^{n-1} k^2$

[8] $2\cdot 1^2 + 3\cdot 2^2 + 4\cdot 3^2 + 5\cdot 4^2 + \ldots$

[9] $0 + 3\cdot 1 + 4\cdot 2 + 5\cdot 3 + 6\cdot 4 + 7\cdot 5 + \ldots$

[10] $1\cdot 2 + 4\cdot 4 + 9\cdot 6 + 16\cdot 8 + 25\cdot 10 + 36\cdot 12 + 49\cdot 14 + \ldots$

Answers

Note: These are computed with *Mathematica* which seems to prefer its polynomials in descending order; i.e. $3 + x + x^2 + x^3$.

[1] $\frac{1}{2}\left(7\,n + 3\,n^2\right)$

[2] $\frac{1}{2}\left(-4 + n + 3\,n^2\right)$

[3] $\frac{1}{6}\left(13\,n + 9\,n^2 + 2\,n^3\right)$

[4] $\frac{1}{6}\left(-5\,n + 3\,n^2 + 2\,n^3\right)$

[5] $\frac{1}{2}\left(-90 + n + n^2\right)$

[6] $3\,(-2 + n)$

[7] $\frac{1}{6}\,(-1 + n)\,n\,(-1 + 2\,n)$

[8] $\frac{1}{12}\,n\,(n+1)\,(n+2)\,(3\,n+1)$

[9] $\frac{1}{6}\left(2\,n^3 + 3\,n^2 - 5\right.$

[10] $\frac{1}{2}\,n^2\,(n+1)^2$