

## Summation

Compute the following sums:

a)  $\sum_{k=1}^5 k^2$

b)  $\sum_{k=1}^3 (2k)^2$

c)  $\sum_{n=1}^4 (-1)^n n$

d)  $\sum_{k=0}^5 2^k$

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$$\begin{aligned} \text{a) } \sum_{k=1}^5 k^2 &= 1^2 + 2^2 + 3^2 + 4^2 + 5^2 \\ &= 1 + 4 + 9 + 16 + 25 \\ &= 55 \end{aligned}$$

$$\begin{aligned} \text{b) } \sum_{k=1}^3 (2k)^2 &= 4 \sum_{k=1}^3 k^2 \\ &= 4 (1 + 4 + 9) \\ &= 56 \end{aligned}$$

$$\begin{aligned} \text{c) } \sum_{n=1}^4 (-1)^n n &= -1 + 2 - 3 + 4 \\ &= 2 \end{aligned}$$

$$\begin{aligned} \text{d) } \sum_{k=0}^5 2^k &= 2^0 + 2^1 + 2^2 + 2^3 + 2^4 + 2^5 \\ &= \frac{1(1-2^6)}{1-2} \\ &= \frac{-63}{-1} \\ &= 63 \end{aligned}$$