

# Ayudantía Matemáticas Avanzadas I N.5

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1.  $\sum_{k=50}^{100} 2(k+4)$

2.  $\sum_{k=3}^{50} \ln\left(\frac{k}{k+1}\right)$

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

4.  $\sum_{k=1}^n k(k+1)(k+2)$

5.  $\sum_{k=3}^n \frac{2}{k^2 + 2k}$

6. Calcular  $\sum_{k=1}^{100} a_k$ , donde  $(a_k)_{k \in \mathbb{N}}$  es la sucesión definida por:

$$a_k = \begin{cases} \frac{3-2^k}{4} & \text{si } 1 \leq k \leq 50 \\ \sqrt{k+2} - \sqrt{k} & \text{si } k > 50 \end{cases}$$

7. **Bonus**, dado  $0 < p < 1$ , determine  $w \in \mathbb{R}$  tal que:

$$\sum_{k=1}^n w(1-p)^{k-1} = 1$$

# Fórmulas

$$1. \sum_{k=1}^n 1 = n$$

$$2. \sum_{k=1}^n c = nc, \text{ donde } c \in \mathbb{R}$$

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

$$4. \sum_{k=1}^n k^2 = \frac{n(n+1)(2n+1)}{6}$$

$$5. \sum_{k=1}^n k^3 = \left( \frac{n(n+1)}{2} \right)^2$$

$$6. \sum_{k=m-l}^{n-l} a_{k+l} = \sum_{k=m}^n a_k = \sum_{k=m+l}^{n+l} a_{k-l}, \text{ con } l \leq m < n.$$

$$7. \sum_{k=1}^n r^k = \frac{r(1-r^n)}{1-r}, \text{ donde } r \in \mathbb{R} - \{1\}$$

$$8. \sum_{k=m}^n (a_k - a_{k+1}) = a_m - a_{n+1}, \text{ con } 1 \leq m \leq n. \text{ (Propiedad Telescópica)}$$

$$9. \sum_{k=m}^n a_k = \sum_{k=1}^n a_k - \sum_{k=1}^{m-1} a_k, \text{ con } 1 \leq m < n.$$

$$10. \sum_{k=1}^n a_k = \sum_{k=1}^m a_k + \sum_{k=m+1}^n a_k, \text{ con } 1 \leq m < n.$$