

### Ejercicio 53

Calcula la suma de los 9 primeros términos de las siguientes progresiones:

a) 3, -12, 48, -192, ...

d)  $a_2 = 8, r = 2$

b)  $\sqrt{5}, 5, 5\sqrt{5}, 25, \dots$

e)  $a_1 = 1, a_3 = \frac{1}{4}$

c)  $a_n = 7 \cdot (\sqrt{5})^{n+1}$

f)  $a_5 = 9, r = \sqrt{3}$

**Solución.**

$$S_n = \frac{a_1 \cdot (r^n - 1)}{r - 1} \implies S_9 = \frac{a_1 \cdot (r^9 - 1)}{r - 1}$$

a) 3, -12, 48, -192, ...

$$\begin{cases} a_1 = 3 \\ r = -12/3 = -4 \end{cases} \implies S_9 = \frac{3 \cdot [(-4)^9 - 1]}{-4 - 1} \implies \boxed{S_9 = 157287}$$

b)  $\sqrt{5}, 5, 5\sqrt{5}, 25, \dots$

$$\begin{aligned} \begin{cases} a_1 = \sqrt{5} \\ r = 5/\sqrt{5} = \sqrt{5} \end{cases} &\implies S_9 = \frac{\sqrt{5} \cdot [(\sqrt{5})^9 - 1]}{\sqrt{5} - 1} = \frac{(5^5 - \sqrt{5}) \cdot (\sqrt{5} + 1)}{(\sqrt{5} - 1) \cdot (\sqrt{5} + 1)} \\ &\implies S_9 = \frac{5^5 \sqrt{5} + 5^5 - 5 - 1}{5 - 1} = \frac{5^5 \sqrt{5} + 5^5 - 6}{4} \implies \boxed{S_9 = 2526,7} \end{aligned}$$

c)  $a_n = 7 \cdot (\sqrt{5})^{n+1}$

$$\begin{aligned} \begin{cases} a_1 = 35 \\ a_2 = 35\sqrt{5} \\ r = a_2/a_1 = \sqrt{5} \end{cases} &\implies S_9 = \frac{35 \cdot ((\sqrt{5})^9 - 1)}{\sqrt{5} - 1} = \frac{35 \cdot ((\sqrt{5})^9 - 1) \cdot (\sqrt{5} + 1)}{(\sqrt{5} - 1) \cdot (\sqrt{5} + 1)} \\ &= \frac{35 \cdot (5^5 + 5^4 \cdot \sqrt{5} - \sqrt{5} - 1)}{5 - 1} \implies \boxed{S_9 = 39544} \end{aligned}$$

d)  $a_2 = 8, r = 2$

$$\begin{cases} a_1 = a_2/r = 8/2 = 4 \\ r = 2 \end{cases} \implies S_9 = \frac{4 \cdot (2^9 - 1)}{2 - 1} \implies \boxed{S_9 = 2044}$$

e)  $a_1 = 1, a_3 = \frac{1}{4}$

$$\begin{cases} a_1 = 1 \\ a_3 = a_1 \cdot r^{3-1} \Rightarrow 1/4 = 1 \cdot r^2 \Rightarrow r = \pm 1/2 \end{cases} \implies \begin{cases} S_9 = \frac{1 \cdot \left[\left(\frac{1}{2}\right)^9 - 1\right]}{\frac{1}{2} - 1} \Rightarrow \boxed{S_9 = \frac{522}{256}} \\ S_9 = \frac{1 \cdot \left[\left(-\frac{1}{2}\right)^9 - 1\right]}{-\frac{1}{2} - 1} \Rightarrow \boxed{S_9 = \frac{171}{256}} \end{cases}$$

f)  $a_5 = 9, r = \sqrt{3}$

$$\begin{cases} a_5 = a_1 \cdot r^{5-1} \Rightarrow 9 = a_1 \cdot (\sqrt{3})^4 \Rightarrow a_1 = 1 \\ r = \sqrt{3} \end{cases} \Rightarrow S_9 = \frac{1 \cdot [(\sqrt{3})^9 - 1]}{\sqrt{3} - 1} \Rightarrow \boxed{S_9 \simeq 190}$$

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