PUNTO 26

a) $\Delta x = \frac{(b-a)}{N}$

$b=2$

$a=0$

$\Delta x = \frac{2-0}{N} = \frac{2}{N}$ //

b) $x_i = a + i\Delta x$

$a=0$

$\Delta x = \frac{2}{N}$

$x_i = 0 + i \cdot \frac{2}{N} = \frac{2i}{N}$ → PARA $i=0,1,2$ HASTA $N-1$ (29)

c) $f(x_i) = x_i^3$

REEMPLAZAMOS

$f(x_i) = \left(\frac{2i}{N}\right)^3 = \left(\frac{8i^3}{N^3}\right)$

PARA $i=0,1,2$ HASTA $N-1$ (29)

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D) la Suma de Riemann es

$$I \approx \sum_{i=0}^{N-1} f(x_i)\Delta x$$

Como $f(x_i) = \frac{8i^3}{N^3}$ y $\Delta x = \frac{2}{N}$

$$I \approx \sum_{i=0}^{N-1} \frac{8i^3}{N^3} \cdot \frac{2}{N}$$

Simplificamos

$$I \approx \frac{16}{N^4} \sum_{i=0}^{N-1} i^3$$

Sabiendo que sustituimos

$$\sum_{i=0}^{N-1} i^3 = \frac{(N(N-1))^2}{4} \to I \approx \frac{16}{N^4} \cdot \frac{N^2(N-1)^2}{4}$$

Simplificando y expandiendo

$$I \approx 4 \cdot \frac{(N-1)^2}{N^2} = 4 \cdot \left(1 - \frac{2N}{N^2} + \frac{1}{N^2}\right)$$

llegamos

$$I \approx 4\left(1 - \frac{2}{N} + \frac{1}{N^2}\right)$$

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