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Enfermería bachillerato

PLATAFORMA

$F(x) = x^2 + 4x + 2$

$a = 0$ $\quad \int_0^4 (x^2+4x+2)\,dx$ $\quad \Delta x = \frac{b-a}{n}$

$b = 4$ $\quad \int_b^a f(x)\,dx = \lim_{n\to\infty} \sum_{k=1}^{n} F(a+k\Delta x)\Delta x$

Calculamos Δx

$\Delta x = \frac{b-a}{n} = \frac{4-0}{n} = \frac{4}{n}$

Calculamos $F(a+k\Delta x) =$

$f(0+k(\frac{4}{n})) = f(0+\frac{4k}{n}) = \frac{4k}{n}$

Sustitución

$F(\frac{4k}{n}) = (\frac{4k}{n})^2 + 4(\frac{4k}{n}) + 2$

$= (\frac{4k}{n})^2 = \frac{16k^2}{n^2} \quad = 4 \cdot \frac{4k}{n} = \frac{16k}{n}$ $\quad$ constante $= 2$

$= F(\frac{4k}{n}) = \frac{16k^2}{n^2} + \frac{16k}{n} + 2$

Sustituimos

$\sum_{k=1}^{n} F(\frac{4k}{n}) \cdot (\Delta x) = \sum_{k=1}^{n} (\frac{16k^2}{n^2} + \frac{16k}{n} + 2) \cdot \frac{4}{n}$

Multiplicar

$\sum_{k=1}^{n} (\frac{64k^2}{n^3} + \frac{64k}{n^2} + \frac{8}{n})$

Separamos

$\frac{64k}{n^3} \sum_{k=1}^{n} k^2 + \frac{64}{n^2} \sum_{k=1}^{n} k + \sum_{k=1}^{n} \frac{8}{n}$

Aplicar Formulas

$\sum_{k=1}^{n} k^2 = \frac{n(n+1)(2n+1)}{6} \quad \sum_{k=1}^{n} k = \frac{n(n+1)}{2} \quad \sum_{k=1}^{n} \frac{8}{n} \cdot n = 8$

$\frac{64}{n^3} \cdot \frac{n(n+1)(2n+1)}{6} + \frac{64}{n^2} \cdot \frac{n(n+1)}{2} + 8$

Simplificamos

$\frac{64n(n+1)(2n+1)}{6n^3}$

$\frac{64n(n+1)}{2n^2} + \frac{32(n+1)}{n}$

8

Calcular limite $n=\infty$

$\lim n=\infty \; \frac{64n(n+1)(2n+1)}{6n^3} = \frac{64 \cdot 1 \cdot 2}{6} = \frac{128}{6} = \frac{64}{3}$

$\lim n=\infty \; \frac{32(n+1)}{n} = 32(1+\frac{1}{2}) = 32$

$\lim n=\infty = 8 = 8$

Sumar todo

$\frac{64}{3} + 32 + 8 = \frac{64}{3} + \frac{40}{1} = \frac{120+64}{3} = \frac{184}{3}$

Resultado

$\int_0^4 (x^2+4x+2)dx = \frac{184}{3}$