

Cálculo II

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2º Exercício Analítico - 2ª Nota

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a) $\int_1^3 x^3 / 3 + 4x dx$

$$\int \frac{x^3 + 4x}{3} dx$$

$$\int \frac{x^3}{3} dx + \int 4x dx$$

$$\left(\frac{x^4}{12} + 2x^2 \right) \Big|_1^3$$

$$\frac{3^4}{12} + 2 \cdot 3^2 - \left(\frac{1^4}{12} + 2 \cdot 1^2 \right)$$

$$\frac{81}{12} + 2 \cdot 9 - \left(\frac{1}{12} + 2 \right) \rightarrow \frac{81}{12} + 18 - \frac{25}{12} \rightarrow \left(\frac{68}{3} \right)$$

b) $\int_0^4 \frac{\sqrt{x}}{2} + x^2 dx$

$$\int \frac{x^{\frac{1}{2}}}{2} + x^2 dx \rightarrow \int \frac{x^{\frac{1}{2}}}{2} dx + \int x^2 dx$$

$$\frac{x \sqrt{x}}{3} + \frac{x^3}{3} \rightarrow \frac{x \sqrt{x}}{3} + \frac{x^3}{3} \Big|_0^4$$

$$\frac{4 \sqrt{4}}{3} + \frac{4^3}{3} - \frac{0 \sqrt{0}}{3} - \frac{0^3}{3}$$

$$\frac{4 \cdot 2}{3} + \frac{64}{3} - \frac{0}{3} - \frac{0}{3} \rightarrow \frac{8}{3} + \frac{64}{3} - 0 - 0 \rightarrow \left(\frac{72}{3} \right)$$

$$c) \int_1^e \frac{dx}{2x}$$

$$\frac{1}{2} \int x^{-1+1} dx$$

$$\frac{1}{2} \ln x$$

$$\frac{1}{2} \ln 1 - \frac{1}{2} \ln e$$

$$d) \int_0^{-1} x^3 - 4x^2 + 1 dx$$

$$\int_{-1}^0 -x^3 + 4x^2 - 1 dx$$

$$\int -x^3 + 4x^2 - 1 dx$$

$$- \int x^3 dx + \int 4x^2 dx - \int 1 dx$$

$$\left(-\frac{x^4}{4} + \frac{4x^3}{3} - x \right) \Big|_{-1}^0$$

$$- \frac{0^4}{4} + \frac{4 \cdot 0^3}{3} - 0 - \left(-\frac{(-1)^4}{4} + \frac{4 \cdot (-1)^3}{3} - (-1) \right)$$

$$- 0 + \frac{0}{3} - \left(-\frac{1}{4} + \frac{(-4)}{3} + 1 \right) \rightarrow 0 - \left(-\frac{7}{12} \right) \rightarrow \left(\frac{7}{12} \right)$$

$$e) \int_0^1 \frac{x^2}{4} + 5x + 1 dx$$

$$\int \frac{x^2}{4} dx + \int 5x dx + \int 1 dx$$

$$\left(\frac{x^3}{12} + \frac{5x^2}{2} + x \right) \Big|_0^1$$

$$\frac{1^3}{12} + \frac{5 \cdot 1^2}{2} + 1 - \left(\frac{0^3}{12} + \frac{5 \cdot 0^2}{2} + 0 \right)$$

$$\frac{1}{12} + \frac{5}{2} + 1 - \left(0 + 0 \right) \rightarrow \frac{1}{12} + \frac{5}{2} + 1 - 0 \rightarrow \left(\frac{43}{12} \right)$$

$$f) \int_{-1}^2 x(1+x^3) dx$$

$$\int x dx + \int x^4 dx$$

$$\left(\frac{x^2}{2} + \frac{x^5}{5} \right) \Big|_{-1}^2$$

$$\frac{2^2}{2} + \frac{2^5}{5} - \left(\frac{(-1)^2}{2} + \frac{(-1)^5}{5} \right)$$

$$2 + \frac{32}{5} - \left(\frac{1}{2} + \frac{(-1)}{5} \right) \rightarrow 2 + \frac{32}{5} - \frac{3}{10} \rightarrow \left(\frac{81}{10} \right)$$

$$g) \int_1^3 x^3/2 + 5x^2 + 3 dx$$

$$\int \frac{x^3}{2} dx + \int 5x^2 dx + \int 3 dx$$

$$\left(\frac{x^4}{8} + \frac{5x^3}{3} + 3x \right) \Big|_1^3$$

$$\frac{3^4}{8} + \frac{5 \cdot 3^3}{3} + 3 \cdot 3 - \left(\frac{1^4}{8} + \frac{5 \cdot 1^3}{3} + 3 \cdot 1 \right)$$

$$\frac{81}{8} + 5 \cdot 9 + 9 - \frac{115}{24} \rightarrow \frac{81}{8} + 45 + 9 - \frac{115}{24}$$

$$\frac{16}{3} + 54 \rightarrow \left(\frac{178}{3} \right)$$

$$h) \int_{-1}^2 3x^2 - 2x + 1 dx$$

$$\int 3x^2 dx - \int 2x dx + \int 1 dx$$

$$(x^3 - x^2 + x) \Big|_{-1}^2$$

$$2^3 - 2^2 + 2 - ((-1)^3 - (-1)^2 - 1)$$

$$8 - 4 + 2 - (-3)$$

$$8 - 4 + 2 + 3 \rightarrow (9)$$

i) $\int_{-1}^0 2x + x^2 - x^3 dx$

$\int 2x dx + \int x^2 dx - \int x^3 dx$

$\left(\frac{x^2}{3} + \frac{x^3}{4} - \frac{x^4}{4} \right) \Big|_{-1}^0$

$0^2 + \frac{0^3}{3} - \frac{0^4}{4} - \left(\frac{(-1)^2}{3} + \frac{(-1)^3}{4} - \frac{(-1)^4}{4} \right)$

$0 + \frac{0}{3} - \frac{0}{4} - \left(\frac{1}{3} + \frac{(-1)}{4} - \frac{1}{4} \right) \rightarrow 0 - 0 - \frac{5}{12} \rightarrow \left(-\frac{5}{12} \right)$

j) $\int_1^2 3 + 4x^3 + 7x / \sqrt{x} dx$

$\int 3 + 4x^3 + 7\sqrt{x} dx$

$\int 3 + 4x^3 + 7x^{\frac{1}{2}} dx$

$\int 3 dx + \int 4x^3 dx + \int 7x^{\frac{1}{2}} dx$

$\left(\frac{3x}{3} + \frac{x^4}{4} + \frac{14x\sqrt{x}}{3} \right) \Big|_1^2$

$3 \cdot 2 + \frac{2^4}{4} + \frac{14 \cdot 2\sqrt{2}}{3} - \left(\frac{3 \cdot 1}{3} + \frac{1^4}{4} + \frac{14 \cdot 1\sqrt{1}}{3} \right)$

$22 + \frac{28\sqrt{2}}{3} - \left(4 + \frac{14}{3} \right) \rightarrow 22 + \frac{28\sqrt{2}}{3} - \frac{26}{3}$

$\frac{40}{3} + \frac{28\sqrt{2}}{3} \rightarrow \boxed{\frac{40 + 28\sqrt{2}}{3}}$

$$K) \int_1^4 \frac{x^2 - 1}{x^2} + \sqrt{x}$$

$$\frac{x^2}{x^2} - \frac{1}{x^2} + x^{\frac{1}{2}}$$

$$\int 1 - x^{-2+1} + x^{\frac{1}{2}+1}$$

$$\left(\frac{x+1}{x} + \frac{x^{\frac{3}{2}}}{\frac{3}{2}} \right)$$

$$\left(\frac{x+1}{x} + \frac{2}{3} \sqrt{x^3} \right) \Big|_1^4$$

$$\left(\frac{1+1}{3} \right) - \left(\frac{4+1}{4} + \frac{2 \cdot 8}{3} \right)$$

$$\frac{2}{3} - \frac{5}{4} - \frac{16}{3} \rightarrow -\frac{2}{1} - \frac{14}{3} - \frac{1}{4}$$

$$-24 - 56 - 3 = \boxed{-83 \over 12}$$

$$L) \int_{-1}^2 2x^3 + x^2 - 2x + 1 dx$$

$$\int 2x^3 dx + \int x^2 dx - \int 2x dx + \int 1 dx$$

$$\left(\frac{x^4}{2} + \frac{x^3}{3} - x^2 + x \right) \Big|_{-1}^2$$

$$\frac{2^4}{2} + \frac{2^3}{3} - 2^2 + 2 - \left(\frac{(-1)^4}{2} + \frac{(-1)^3}{3} - (-1)^2 - 1 \right)$$

$$\frac{2^3}{3} + \frac{8}{3} - 4 + 2 - \left(\frac{1}{2} + \frac{(-1)}{3} - 1 - 1 \right)$$

$$\frac{8}{3} + \frac{8}{3} - 4 + 2 - \left(\frac{1}{6} - 2 \right) \rightarrow \frac{8}{3} + \frac{8}{3} - 4 + 2 - \left(-\frac{11}{6} \right)$$

$$\frac{8}{3} + \frac{8}{3} - 4 + 2 + \frac{11}{6} = 6 + \frac{9}{2} = \boxed{\frac{21}{2}}$$