

Lista 5

$$a) \int_{-1}^2 6x^4 dx = \frac{6 \times 5}{5} x^5 = 6 \left(\frac{2^5}{5} - \frac{(-1)^5}{5} \right)$$

$$6 \left(\frac{32}{5} + \frac{1}{5} \right) = \frac{6 \times 33}{5} = \frac{198}{5}$$

$$b) \int_0^{2\pi} \sin(2x) dx = \int_0^{4\pi} \frac{\sin u}{2} du = \frac{1}{2} [-\cos u]$$

$$u = 2x$$

$$dx = \frac{du}{2}$$

$$\frac{1}{2} (-1 - (-1)) = \frac{1}{2} \times 0 = 0$$

$$x=0 \Rightarrow u=0$$

$$x=2\pi \Rightarrow u=4\pi$$

$$c) \int_{-2}^3 x^3 - \int_{-2}^3 2x^2 + \int_{-2}^3 7x + \int_{-2}^3 1$$

$$\frac{1}{4} x^4 - \frac{2}{3} x^3 + \frac{7}{2} x^2 + x \Big|_{-2}^3 =$$

$$\frac{1}{4} (81 - 2) - \frac{2}{3} (27 - 8) + \frac{7}{2} (9 - 4) + (3 - (-2)) = \frac{79}{4} - \frac{40}{3} + \frac{35}{2} + 5 = \frac{20}{3}$$

$$d) \int_0^4 (\sqrt{2x+1}) = \int_1^9 \sqrt{u} du = \frac{1}{2} \int_1^9 u^{1/2} du = \frac{1}{2} \left[\frac{u^{3/2}}{3/2} \right]_1^9$$

$$u = 2x+1$$

$$\frac{1}{2} \left[\frac{2 \times 2 \times 2}{3} - \frac{2}{3} \right] = \frac{1}{2} \left(\frac{54}{3} - \frac{2}{3} \right)$$

$$x=4, u=9$$

$$x=0, u=1$$

$$\frac{52}{6} = \frac{26}{3}$$

$$c) \int_1^2 (6x-1)dx \Rightarrow \int_1^2 6x - \int_1^2 1 = 6 \left| \frac{x^2}{2} \right|_1^2 - \left| x \right|_1^2$$

$$6 \left(\frac{2^2-1}{2} \right) - (2-1) = \frac{18}{2} - 1 = 8$$

$$g) \int_1^2 x(1+x^3)dx = \int_1^2 (x+x^4)dx = \int_1^2 x + \int_1^2 x^4$$

$$\left| \frac{x^2}{2} \right|_1^2 + \left| \frac{x^5}{5} \right|_1^2 = \left(\frac{2^2-1}{2} \right) + \left(\frac{32-1}{5} \right) \Rightarrow \frac{3}{2} + \frac{31}{5}$$

$$\frac{15+66}{10} = \frac{81}{10}$$

$$f) \int_{-3}^0 (x^2-4x+7)dx = \int_{-3}^0 x^2 - \int_{-3}^0 4x + \int_{-3}^0 7$$

$$\left| \frac{x^3}{3} \right|_{-3}^0 - 4 \left| \frac{x^2}{2} \right|_{-3}^0 + 7 \left| x \right|_{-3}^0 = (0+9) - (0-\frac{9}{2}) + (0+3)$$

$$9 + \frac{9}{2} + 3 = \frac{18+9+6}{2} = \frac{33}{2}$$

$$h) \int_{\frac{\pi}{4}}^{\frac{3\pi}{4}} \sin x \cdot \cos x = \int_{\frac{\pi}{4}}^{\frac{3\pi}{4}} \frac{\sin(2x)}{2} dx = \frac{1}{4} \int_{\frac{\pi}{4}}^{\frac{3\pi}{4}} \sin(u) du$$

$$u=2x$$

$$\frac{du}{dx} = 2$$

$$dx = \frac{du}{2}$$

$$\frac{1}{4} \left(-\cos(u) \right)_{\frac{\pi}{2}}^{\frac{3\pi}{2}} = \frac{1}{4} (0+0) = 0$$

$$1) \int_{-1}^1 \frac{x^2}{\sqrt{x^2+9}} dx \quad \int_{-1}^1 \frac{x^2}{u} \frac{du}{3x} \quad \int \frac{2}{3} du$$

$$u = \sqrt{x^2+9} \rightarrow x=-1 \rightarrow \sqrt{-1+9} = \sqrt{8} \Rightarrow 2\sqrt{2}$$

$$x=1 \rightarrow \sqrt{10}$$

$$\frac{du}{dx} = \frac{3x^2}{2\sqrt{x^2+9}}$$

$$\frac{2}{3} \left[\frac{u}{3} \right]_{2\sqrt{2}}^{\sqrt{10}} = \left(\frac{2\sqrt{10}}{3} - \frac{4\sqrt{2}}{3} \right)$$

$$dx = \frac{du \cdot 2\sqrt{x^2+9}}{3x^2}$$

$$dx = \frac{du \cdot 2u}{3x^2}$$

$$J) \int_1^2 \frac{5x^2+7x^2-5x+2}{x^2} dx = \int 9x + 7 - \frac{5}{x} + \frac{2}{x^2} \rightarrow 2\sqrt{x^2} \frac{2x^3}{3}$$

$$\left[\frac{5x^2}{2} + 7x - 5\ln(x) + \frac{2x^3}{3} \right]_1^2 =$$

$$\left(10 + 14 - 5\ln(2) + \frac{16}{3} - \left(\frac{5}{2} + 7 - 5\ln(1) + \frac{2}{3} \right) \right)$$

$$\left(10 + 14 - 5\ln(2) + \frac{16}{3} + \frac{5}{2} - 7 + 5\ln(1) - \frac{2}{3} \right)$$

$$17 + \frac{14}{3} + \frac{5}{2} - 5\ln(2) + 5\ln(1)$$