Kerby Lovince

1)

Kerby Lovince

$f(x) = x^4 - 2x^2 + 2$

a) determino o Pontos criticos

$y = 4x^3 - 4x = 0$

$y = 2x(2x^2 - 2) = 0$

$2x = 0 \; , \; 2x^2 - 2 = 0$

$2x = 0$

$x = \frac{0}{2} \; , \; x = 0$

$2x^2 - 2 = 0$

$2x^2 = 2$

$x^2 = \frac{2}{2}$

$x = \pm 1 \Rightarrow x = -1 \; , \; x = 1$

Ponto criticos

$P(-1, 0, 1)$

b) $(2, -1)$ decrescente

$(2, 1)$ descrescente

$(1, +\infty)$ crescente

c) Ponto de maximo e minimo

Teste da primeira derivada

$y' = 4x^3 - 4x$

$y' = 12x^2 - 4$

$P(-1) = 12(-1)^2 - 4 = 8 > 0$ min

$P(0) = 12(0)^2 - 4 = -4 < 0$ Max

$P(1) = 12(1)^2 - 4 = 8 > 0$ min

$g(x) = x^4 - 2x^2 + 2$

$g(-1) = (-1)^4 - 2(-1)^2 + 2 = 1 \quad (-1, 1)$

$g(0) = 0^4 - 2(0)^2 + 2 = 2 \quad (0, 2)$

$g(1) = 1^4 - 2(1)^2 + 2 = 1 \quad (1, 1)$

o Ponto de max e min

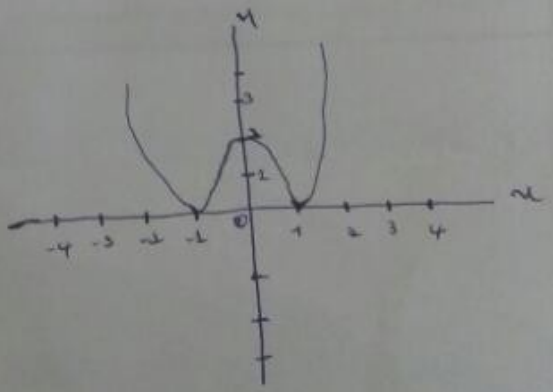
$(-1, 1)$ minimo

$(0, 2)$ maximo

$(1, 1)$ minimo

d) o Ponto de inflecão

$f(x) = 1 < 1, \infty$



Questão 2

$a = 37,\overline{5}$, $b = 37,5\overline{a}$

$x = a + 2,5$ $x = a + 2$

$y = b + 3$, $y = b + 2$

$A = xy$ deve ser mínima

$A = (a + 4,5) \cdot (b + 5,5)$

$A = (a + 4,5) \cdot (37,5\overline{a} + 5,5)$

$A = 5,\overline{5} - 1687,\overline{5a}$

dada $= 0$

$5,\overline{5} - 1687,\overline{5a} = 0$

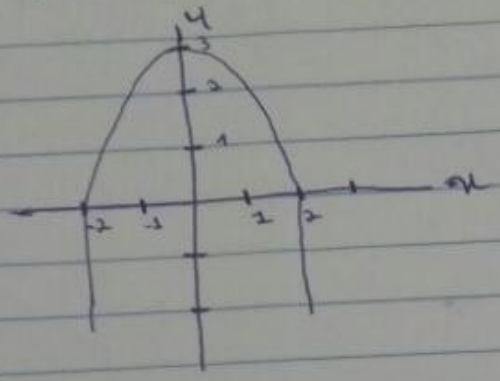
$5,5a = 1687,5$

$a = 1687,5\overline{5}$

Então a dimensão é $1687,55\overline{5},5$

Questão 3

$f(x) = 5 - x^2$, $x=0$, $x=2$, $y=0$, $y=f(x)$



$$\int_x^4 f(4) - f(x)$$

$$\int_0^2 5 - x^2 \, dx$$

$$\int_0^2 5 - x^2 = -1\frac{x^{2+1}}{2+1} + 5x$$

$$\int_0^2 5 - x^2 = -\frac{1}{3}x^3 + 5x$$

$$\int_0^2 5 - x^2 = -\frac{1}{3}.2^3 + 5(2) - \left(-\frac{1}{3}.0^3 + 5(0)\right)$$

$$= -\frac{8}{3} + 10 = \frac{22}{3}$$

$$\int_0^2 5 - x^2 = \frac{22}{3}$$

4)

4) ii) $\int 4x^2 e^x \, dx$

$u = 4x^2, \quad dv = e^x$

$\frac{du}{dx} = 8x \qquad v_1 = e^x$

$4x^2 e^x - \int e^x \cdot \frac{dx}{8x}$

$4x^2 \cdot e^x - 8x e^x + \frac{8}{8} e^x + C$

i) $\int \operatorname{sen}^4(2x) \cos(2x) \, dx$

$\int \operatorname{sen}^4(2x) + \int \cos(2x) \, dx = \int (\operatorname{sen} 2x)^4 \cos 2x \, dx$

$\int v^n \, dv = \frac{v^{n+1}}{n+1}$

$v = \operatorname{sen} 2x$

$dv = \cos 2x \cdot 2 \, dx$

$= \int (\operatorname{sen} 2x)^4 \cos 2x \cdot 2 \, dx$

$= \frac{1}{2} \int (\operatorname{sen} 2x)^4 \cos 2x \cdot 2 \, dx$

$= \frac{1}{2} \frac{(\operatorname{sen} 2x)^{4+1}}{4+1} + C$

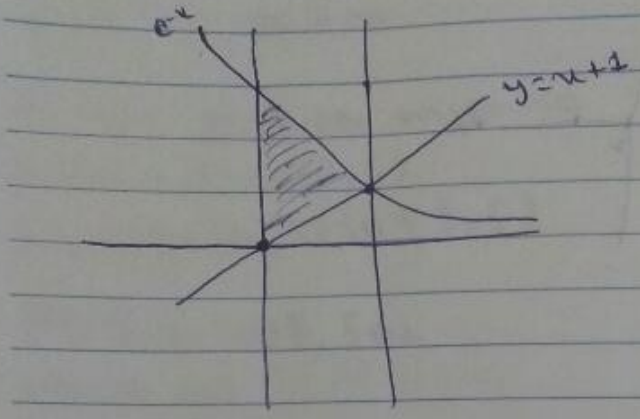
$= \frac{1}{2} \frac{(\operatorname{sen} 2x)^5}{5} + C$

$= \frac{\operatorname{sen}^5 2x}{10} + C$

Questão 5

$y = e^{-x}$, $y = x+1$ e $x = -1$

$y = -1+1 \Rightarrow y = 0$



$$\int_{x}^{y} f(y) - f(x)$$

$$\int_{-1}^{0} (e^{-x} - (x+1))\,dx = (e^{-x} - x - 1\,dx)$$

$$\int_{-1}^{0} -e^{-x} - \frac{x^2}{2} - x$$

$$-1 - (-e - \frac{1}{2} + 1) = -1 + e + \frac{1}{2} - 1$$

$$\int_{-1}^{0}$$

$e - \frac{3}{2}$ u.a