1º

$\frac{da}{dt} = 10\ cm^2/min$

$a = \pi r^2 \rightarrow a' = 2\pi r$

$r = 50\ cm$

$\frac{da}{dt} = \frac{da}{dr} \cdot \frac{dr}{dt}$

$10\ \frac{cm^2}{min} = 2 \cdot \pi \cdot 5\ cm \cdot \frac{dr}{dt}$

$\frac{dr}{dt} = \pi^{-1}\ cm/min$

2º

$\frac{dr}{dt} = -2\ cm/min$

$V = \frac{4\pi r^3}{3} \rightarrow V' = \frac{4\pi 3r^2}{3} = 4\pi r^2$

$r = 50\ cm$

$\frac{dV}{dt} = \frac{dV}{dr} \cdot \frac{dr}{dt}$

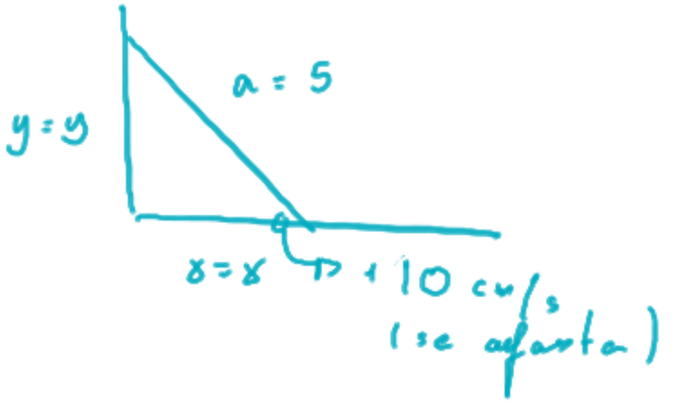
$= 4\pi (50\ cm)^2 \cdot -2\ \frac{cm}{min}$

$= -8\pi \cdot 2500\ \frac{cm^3}{min}$

$= -2 \cdot 10^4\ \frac{cm^3}{min}$

$= -\frac{2 \cdot 10^4}{10^3}\ \frac{dm^3}{min} = -20\ dm^3/min$

3.



$a = x^2 + y^2$

$f(x)\ \ g(x)\ \ h(x)$

$f'(x) = a' = 0$

$g'(x) = 10\ cm/s$

$y'(x) = ?$

$f'(x) = g'(x) + h'(x)$

$0 = 10\ cm/s + y' \rightarrow y' = -10\ cm/s$

(se aproxima)

4. Não sei

5º Encontre os pontos críticos ($f'(x) = 0$ ou $f'(x) \nexists$)

a) $f(x) = -x^3 + x^2 + 1$

$f'(x) = -3x^2 + 2x = 0$

$x(2 - 3x) = 0$

$x = 0$

$2 - 3x = 0$

$x = \frac{2}{3}$

$f(0) = 1 \rightarrow P_1 = (0, 1)$ ~~✓~~

$f\left(\frac{2}{3}\right) = -\frac{8}{27} + \frac{4}{9} + 1$

$= \frac{-8 + 36 + 27}{27} = \frac{55}{27}$

$\rightarrow P_2 = \left(\frac{2}{3}, \frac{55}{27}\right)$ ✓

b) $f(x) = |2x + 1| = 0$

$x = -\frac{1}{2}$

$P_1 = \left(-\frac{1}{2}, 0\right)$

c) $f(x) = \dfrac{x+1}{(x-1)^2}$ (u / v)

$u' = 1$

$v' = 2(x-1) \cdot 1$

$f'(x) = \dfrac{v \cdot u' - v' u}{v^2}$

$= \dfrac{(x-1)^2 - 2(x-1)(x+1)}{(x-1)^4}$

$= \dfrac{(x-1)^2(1-2)}{(x-1)^{+2}}$

$= -(x-1)^{-2}$

$-(x-1)^{-2} = 0$

$x = 1$

$P = (1, 0)$

6. Determine os máximos e mínimos das seguintes funções

a) $f(x) = x^2 - 4x + 3$ em $[0, 5]$ → $(-4)^2 - 4 \cdot 3 = 4$

$f(x) = (x-1)(x-3)$

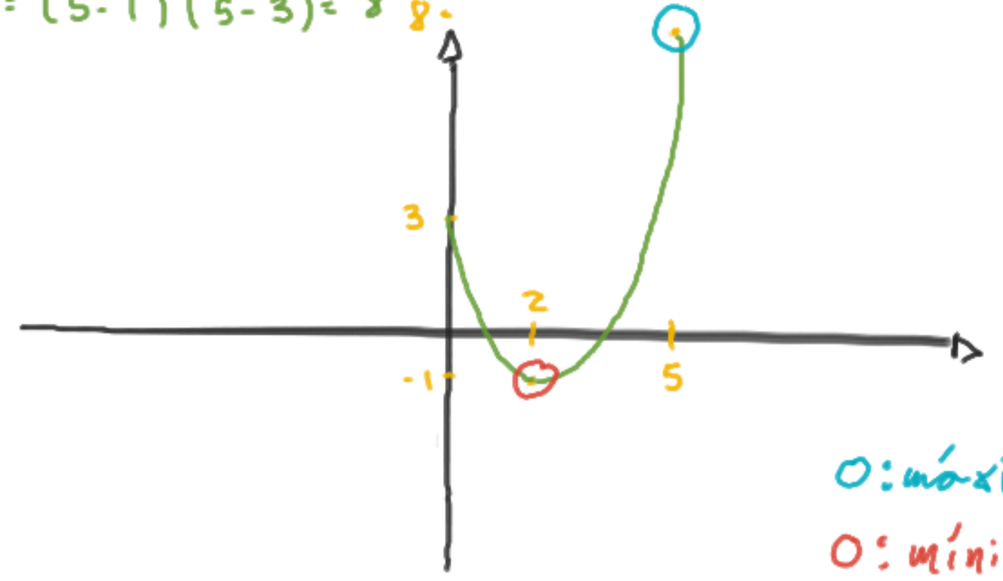
$f'(x) = 2x - 4 \div 2(x-2)$

$\dfrac{-(-4) \pm \sqrt{4}}{2} = \dfrac{4 \pm 2}{2} = 2 \pm 1 \begin{cases} 3 \\ 1 \end{cases}$

Lo $2(x-2) = 0 \rightarrow x = 2$

$f(2) = (2-1)(2-3) = -1$

$f(5) = (5-1)(5-3) = 8$ 8.



O: máximo

O: mínimo

b) $f(x) = x^3 - 3x + 1$ em $[-2, 2]$

$f'(x) = 3x^2 - 3 = 3(x^2 - 1)$

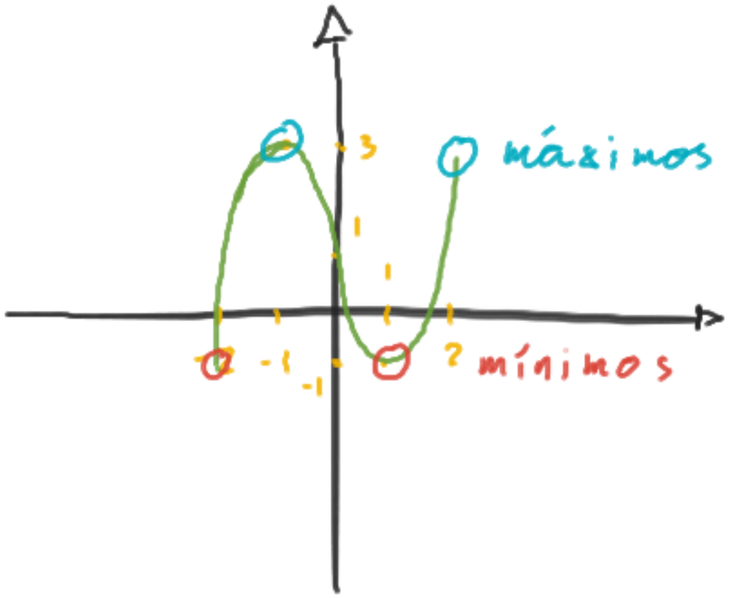
$3(x^2 - 1) = 0$

$x = \pm 1$

$f''(x) = 6x$

$f(-1) = -(-1)^3 + 1 = 3$ $\quad f(-2) = -8 + 6 + 1 = -1$

$f(1) = 1 - 3 + 1 = -1$ $\quad f(2) = 8 - 6 + 1 = 3$



c) $f(x) = \operatorname{sen}(x) + \cos(x)$ em $[0, \pi]$

$f'(x) = \cos(x) - \operatorname{sen}(x)$

$\cos(x) = \operatorname{sen}(x)$

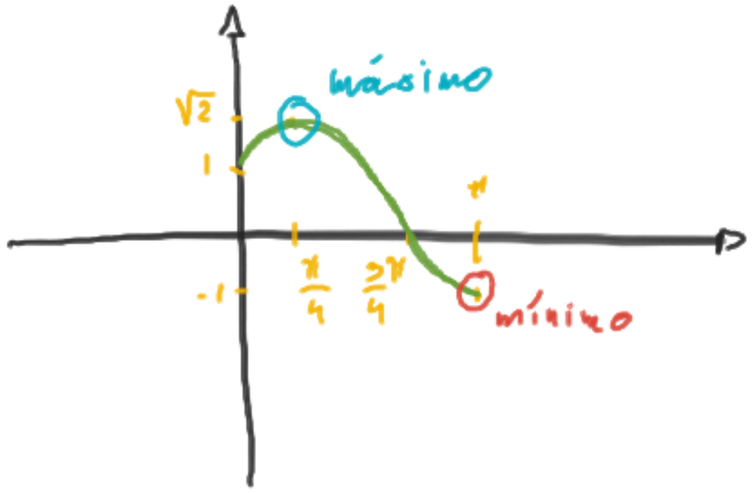
$x = \frac{\pi}{4}$ ou $x = \frac{5}{4}\pi$

$[0, \pi]$

$\operatorname{sen} x + \cos x = 0$

$\operatorname{sen} x = -\cos x$

$x = \frac{\pi}{2} + \frac{\pi}{4} = \frac{3}{4}\pi$



$45 - x$

$180 - \pi$

$x = \frac{45}{180}\pi = \frac{\pi}{4}$

45	180 | 3
15	60 | 3
5	20 | 5
1	4

$\pi + \frac{\pi}{4} = \frac{5}{4}\pi$

d) $f(x) = \underbrace{(x-1)^2}_{u}\underbrace{(x+1)^2}_{v}$ em $[-2, 2]$

$f(12) = 9$

$f(0) = 1$

$u' = 2(x-1) \cdot 1$

$v' = 2(x+1) \cdot 1$

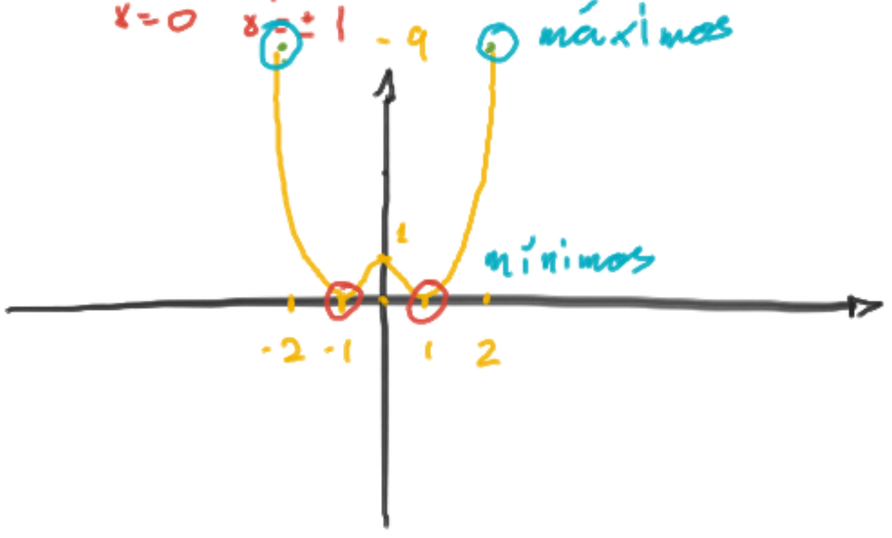
$f'(x) = v \cdot u' + v' \cdot u$

$= (x+1)^2 \cdot 2(x-1) + 2(x+1)(x-1)^2$

$= 2(x^2-1)[x+1 + x-1]$

$= 4x(x^2-1) = 0$

$x = 0$ $x = \pm 1$



e) $f(x) = \frac{x}{x^2+1}$ $u \quad v$ ✓

$u' = 1$

$v' = 2x$

$f'(x) = \frac{v \cdot u' - v' u}{v^2}$

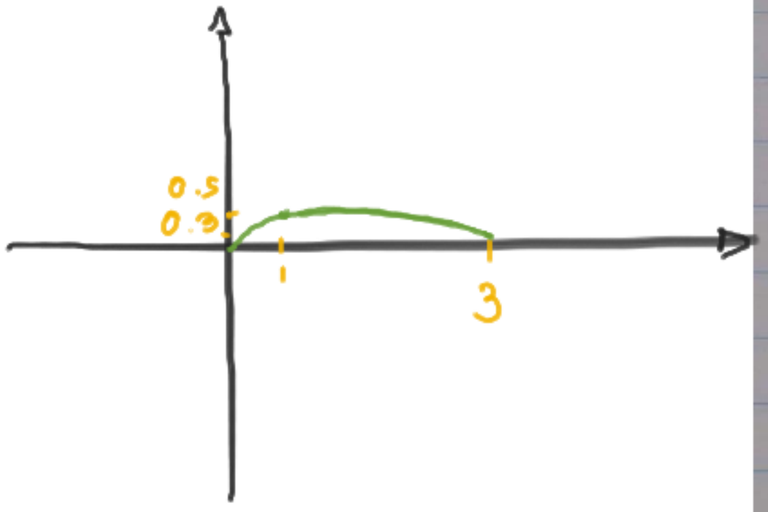
$= \frac{x^2+1 - 2x^2}{(x^2+1)^2}$

$= \frac{1 - x^2}{(x^2+1)^2} = 0$

$x = \pm 1$

$= +1$

$([0, >])$



7. Não sei