6.4 1

a) $$\lim_{x\to 0} \frac{\overbrace{1-e^{4x}}^{f(x)}}{\underbrace{\operatorname{sen}(x)}_{g(x)}} = \lim_{x\to 0} \frac{-4e^{4x}}{\cos(x)} = -4$$

e) $$\lim_{x\to 0} \frac{e^x - 1 - x}{x^2 + \operatorname{sen}^2(x)} = \lim_{x\to 0} \frac{e^x - 1}{2x + 2\underbrace{\operatorname{sen}(x)\cos(x)}_{\cos^2(x) + (-\operatorname{sen}^2(x))}} = \lim_{x\to 0} \frac{\overbrace{e^x}^{1}}{\underbrace{2 + 2\cos^2(x) - 2\operatorname{sen}^2(x)}_{4}} = \frac{1}{4}$$

h) $$\lim_{x\to 1} \frac{x}{x-1} - \frac{1}{\log(x)} = \lim_{x\to 1} \frac{x\log(x) - (x-1)}{(x-1)\log(x)}$$

$$\lim_{x \to 1} \frac{x \log(x) - (x-1)}{(x-1)\log(x)} = \lim_{x \to 1} \frac{1 \log(x) + \frac{1}{x} \cdot x - 1}{1 \cdot \log(x) + \frac{1}{x}(x-1)} =$$

$$\lim_{x \to 1} \frac{\log(x)}{\log(x) + \frac{(x-1)}{x}} = \lim_{x \to 1} \frac{1/x}{1/x + \underbrace{\left[\frac{1x - 1(x-1)}{x^2}\right]}_{\frac{x - x + 1}{x^2} = \frac{1}{x^2}}} = \lim_{x \to 1} \frac{1/x}{1/x + 1/x^2} = \frac{1}{2}$$

6.4

(2) a) $\lim\limits_{x\to\infty} \frac{x^2}{e^x} = \lim\limits_{x\to+\infty} \frac{2x}{e^x} = \lim\limits_{x\to\infty} \frac{2}{e^x} = 0$

d) $\lim\limits_{x\to+\infty} \underbrace{e^{\sqrt{x+1}} - e^{\sqrt{x}}} = \lim\limits_{x\to+\infty} e^{\sqrt{x}}\left(e^{\overbrace{\sqrt{x+1}-\sqrt{x}}^{\sqrt{x}-\sqrt{x}=0}} - 1\right) =$

$e^{\sqrt{x+1}} = e^{\sqrt{x}}(\boxed{})$

$e^{\sqrt{x}} = \boxed{\dfrac{e^{\sqrt{x+1}}}{e^{\sqrt{x}}}} = e^{\sqrt{x+1}-\sqrt{x}}$

$\lim\limits_{x\to\infty} \dfrac{e^{\sqrt{x+1}-\sqrt{x}} - 1}{1/e^{\sqrt{x}}} = \dfrac{-\cancel{e^{\sqrt{x}}}\,1}{2\sqrt{x}\,e^{\sqrt{x}}} = \dfrac{-1}{2\sqrt{x}\,e^{\sqrt{x}}}$

$\lim\limits_{x\to\infty} \dfrac{\boxed{\left(\dfrac{1}{2\sqrt{x+1}} - \dfrac{1}{2\sqrt{x}}\right)} e^{\sqrt{x+1}-\sqrt{x}}}{-1/2\sqrt{x}\,e^{\sqrt{x}}}$

$$\lim_{x \to +\infty} e^{\sqrt{x+1}} - e^{\sqrt{x}} = \lim_{x \to \infty} e^{\sqrt{x}} - e^{\sqrt{x}} = 0$$

$$\lim_{\boxed{x \to \infty}} x + 1 = x$$

$$\lim_{x \to 0} \frac{x+1}{} = 1$$

$$x^2 + x$$

3 $$\lim_{x \to +\infty} x^{1/x} = \lim_{x \to +\infty} e^{\frac{1}{x}\log(x)} = e^{\lim_{x \to +\infty} \frac{1}{x}\log(x)} = e^{0} = 1$$

$$x^{\beta} = e^{\beta \log(x)}$$

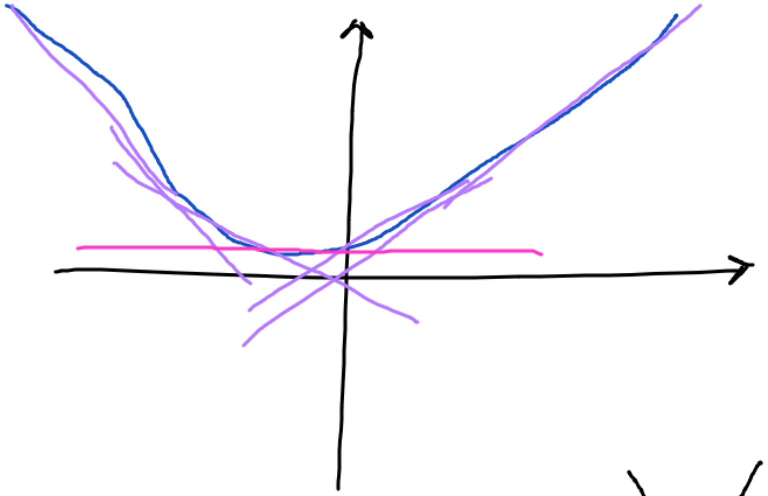
$$\lim_{x \to +\infty} \frac{\log(x)}{x} = \lim_{x \to +\infty} \frac{1/x}{1} = 0$$

$$\lim_{x \to 1} e^{x} = e$$

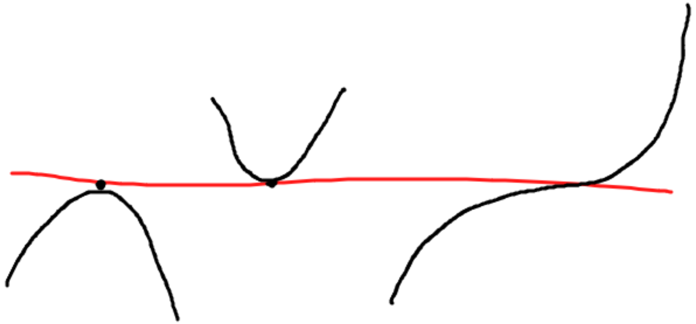
$$\lim_{x \to 1} e^{x} = e^{\lim_{x \to 1} x} = 1$$

6.5 1

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



$$\lim_{x \to +\infty} x^2 + 3x + 1 = +\infty$$

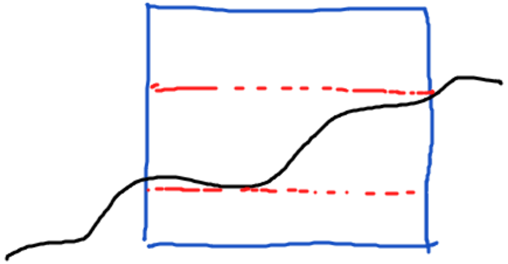


$$\lim_{x \to -\infty} x^2 + 3x + 1 = \lim_{x \to -\infty} x^2 = +\infty$$

$$f'(x) = 0 = 2x + 3 \Rightarrow x = \frac{-3}{2} \Rightarrow f\left(\frac{-3}{2}\right) \text{ es mínimo}$$

2

$f(x) = x^3 - x^2 - 8x + 1 \qquad [-2, 2]$



Candidatos ⊛ extremos

⊛ $f'(x)$

Candidatos $f(-2), f(2), f(-4/3)$

$f'(x) = 3x^2 - 2x - 8$

	3	-2	-8
2		6	8
	3	4	

$-\frac{4}{3}, 2$

$3x + 4 = 0$

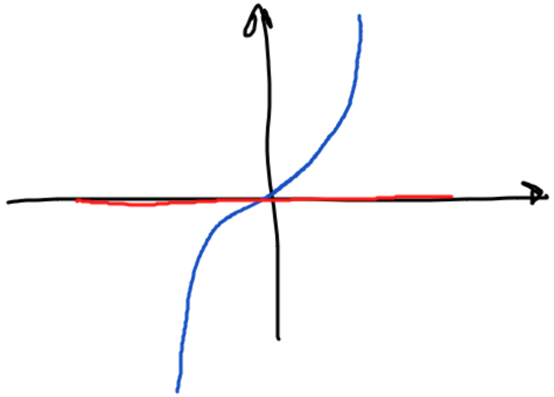
$x = -\frac{4}{3}$

$f(-2) = -8 - 4 + 16 + 1 = 5$

$f(2) = 8 - 4 - 16 + 1 = -11$ min

$f(-4/3) \simeq 7{,}5$ max

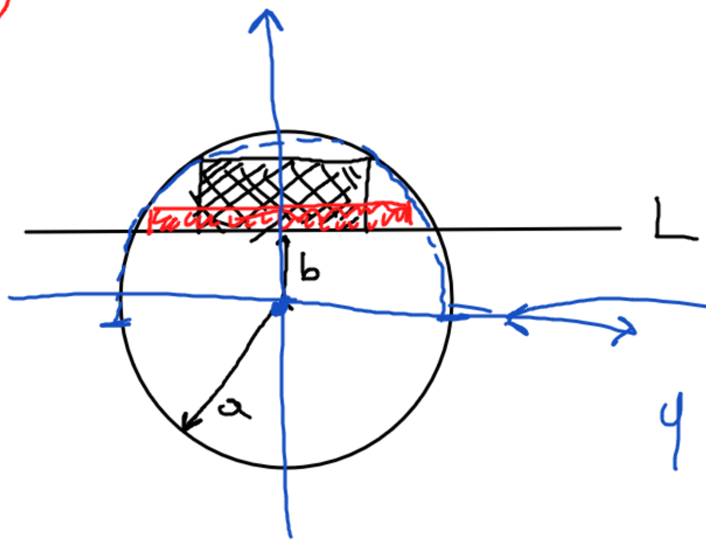
$f(x) = x^3$



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

$f'(x) = 0 \Rightarrow x = 0$

6.6 2



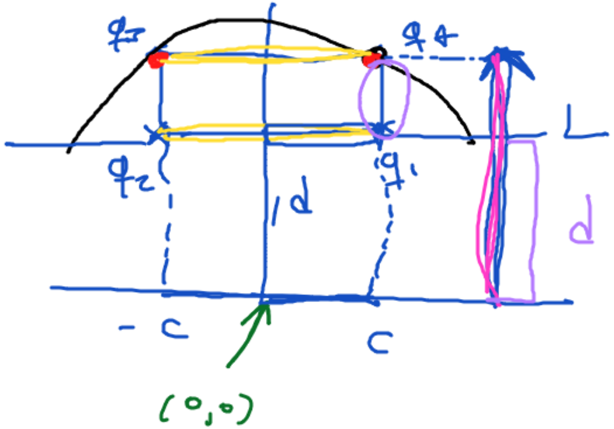
$y = b \pm \sqrt{\cdots}$

$c = (a,b)$

r

$$(x-a)^2 + (y-b)^2 = r^2$$

$$y = \underbrace{b \pm \sqrt{r^2-(x-a)^2}}$$



$q_1 = (c,d)$

$q_2 = (-c,d)$

$$q_3 = \left(-c,\ b+\sqrt{r^2-(-c-a)^2}\right)$$

$$q_4 = \left(c,\ b+\sqrt{r^2-(c-a)^2}\right)$$

$$A(c) = \text{base}\,.\,\text{altura} = \overbrace{(c-(-c))}^{2c}\left(b+\sqrt{r^2-(c-a)^2}-d\right) = 2c\left(b-d+\sqrt{r^2-(c-a)^2}\right)$$

$$A'(c) = 2\left(b-d+\sqrt{r^2-(c-a)^2}\right) + \frac{(-2c)2c}{2\sqrt{r^2-(c-a)^2}}$$

ej. de optim.

1. Encontrar la funcion
2. Una vez que tengan la f
3. $f' = 0$ y sacar x
4. con x encontrar extremos

$$A'(c) = 2\left(b - d + \sqrt{r^2 - (c-a)^2}\right) + \frac{2c^2}{\sqrt{r^2-(c-a)^2}}$$

centro $(a,b) = (0,0)$

$$A'(c) = 0 = 2\left(\sqrt{r^2 - c^2} - d\right) + \frac{2c^2}{\sqrt{r^2-c^2}}$$

$$\left(\sqrt{r^2-c^2} - d\right)\sqrt{r^2-c^2} = -c^2$$

$$r^2 - c^2 - d\sqrt{r^2-c^2} = -c^2$$

$$r^2 = d\sqrt{r^2-c^2} \longrightarrow r^2 - c^2 = \frac{r^4}{d^2} \Rightarrow \boxed{c = \sqrt{r^2 - \frac{r^4}{d^2}}}$$