1- a) $\displaystyle\int \frac{\operatorname{sen}(\sqrt{x})}{\sqrt{x}}\, dx$

$u = \sqrt{x}$

$du = \dfrac{1}{2\sqrt{x}}\, dx$

$2\displaystyle\int \operatorname{sen}(u)\, du$

$-2\cos(\sqrt{x}) + K$ //

b) $$\int \frac{\overbrace{2x-1-3+3}}{x^2-4x+20}\,dx$$

$$\int \frac{2x-4}{x^2-4x+20}\,dx + \int \frac{3}{x^2-4x+20}\,dx$$

$u = x^2-4x+20$

$du = (2x-4)\,dx$

$$\int \frac{du}{u} + \int \frac{3}{x^2-4x+20}\,dx$$

$$= \frac{3}{64}\int \frac{1}{1+h^2}\,dh = \frac{3}{64}\,\operatorname{arctg}(h) + K \qquad h = \frac{u}{4}$$

$$= \frac{3}{64}\,\operatorname{arctg}\left(\frac{x-2}{4}\right) + K \qquad u = x-2, \quad h = \frac{x-2}{4}$$

Logo $\displaystyle\int \frac{2x-1}{x^2-4x+20}\,dx = \ln|x^2-4x+20| + \frac{3}{64}\,\operatorname{arctg}\left(\frac{x-2}{4}\right) + K$ //

$$\int \frac{du}{u} + \int \frac{3}{x^2-4x+20}\,dx$$ ← era o que tínhamos

$$3\int \frac{1}{x^2-4x+20}\,dx$$

$\Delta = (-4) - 4.1.20$

$16 - 80 < 0$

COMPLETAR QUADRADO

$$= 3\int \frac{1}{(x-2)^2+16}\,dx$$

$u = x-2$

$du = dx$

$$3\int \frac{1}{u^2+16}\,du$$

$u = 4h \longrightarrow \frac{du}{4} = dh$

$u^2 = 16h^2$

$$\frac{3}{4}\int \frac{1}{16(1+h^2)}\,dh$$

c) $\int (\ln x)^2 dx$ FORMA 1: $dv = 1dx$ $u = (\ln x)$

$v = x$ $du = 2\ln x \cdot \frac{1}{x} dx$

$$= x(\ln x)^2 - \int \cancel{x} \cdot 2\ln x \cdot \frac{1}{\cancel{x}} dx$$

$$= x(\ln x)^2 - 2\int \ln x \, dx$$

$$= x(\ln x)^2 - 2x(\ln x - 1) + K$$

$$= x\left((\ln x)^2 - 2\ln x + 2\right) + K$$

//

c) $\int (\ln x)\, dx$ FORMA 2: $dv = \ln x\, dx$ $\quad u = \ln x$

$v = x(\ln x - 1)$ $\quad du = \frac{1}{x}\, dx$

$$= \ln x \,.\, x \,.\, (\ln x - 1) - \int \cancel{x}(\ln x - 1) \,.\, \frac{1}{\cancel{x}}\, dx$$

$$= \ln x \,.\, x(\ln x - 1) - \left[x \,.\, \ln x - x - x \right] + K$$

$$= \ln x \,.\, x(\ln x - 1) - x \,.\, \ln x + 2x + K$$

$$= x\left(\ln x(\ln x - 1) - \ln x + 2\right) + K$$

$$= x\left(\ln x(\ln x - 2) + 2\right) + K =$$

FORMA +

REDUZIDA

d) $\displaystyle\int_0 \frac{1}{(x+3)(x+5)}\,dx$ FRAÇÕES PARCIAIS

$$\frac{1}{(x+3)(x+5)} = \frac{A}{x+3} + \frac{B}{x+5} \longrightarrow 1 = A(x+5) + B(x+3)$$

p/ $x = -5$: $1 = B \cdot -2 \longrightarrow B = -\frac{1}{2}$

p/ $x = -3$: $1 = 2A \longrightarrow A = \frac{1}{2}$

d) $\int \frac{1}{\left(\sqrt{x^2+4}\right)^3} dx$

$x = 2 \cdot Tg\,\theta$

$dx = 2 \cdot sec^2\theta \cdot d\theta$

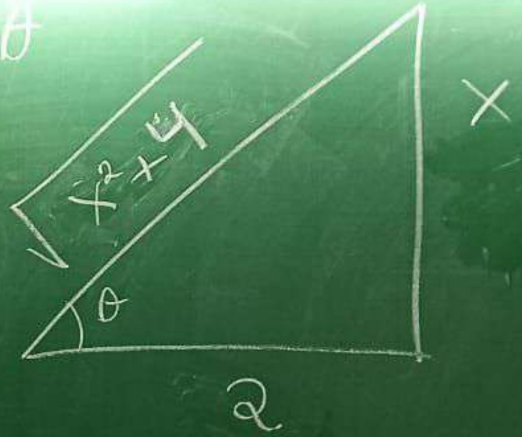
$$= 2\int \frac{sec^2\theta \cdot d\theta}{(2 \cdot sec\theta)^3} = \frac{1}{4}\int \frac{1}{sec\theta} d\theta = \frac{1}{4}\int cos\theta \, d\theta$$

$$= \frac{1}{4} sen\theta + K \longrightarrow$$

θ

$$x = 2\,Tg\,\theta \longrightarrow \frac{x}{2} = Tg\,\theta$$

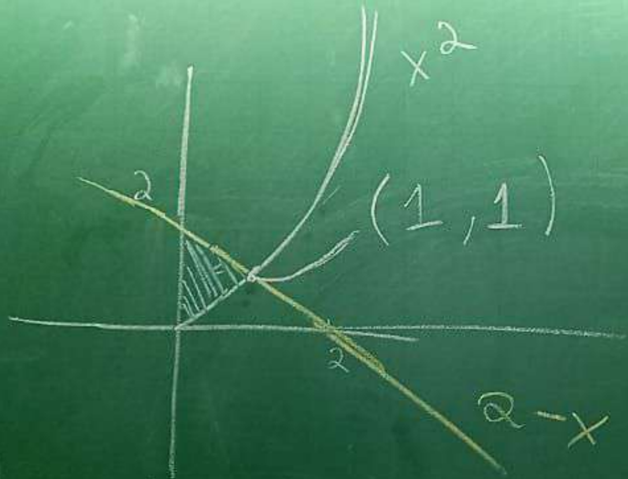
$$sen\,\theta = \frac{x}{\sqrt{x^2+4}}$$



$\cos\theta\, d\theta$

$$\theta + K \longrightarrow = \frac{x}{4\sqrt{x^2+4}} + K$$

2a)



b)

c)

$$V = \pi \int_0^1 (2-x)^2 - (x^2)^2 \, dx = \pi \int_0^1 -x^4 + x^2 - 4x + 4$$

$$= \lim_{x \to \infty} \left[\frac{1}{2} \ln \left| \frac{x+3}{x+5} \right| - \frac{1}{2} \ln \left| \frac{3}{5} \right| \right]$$

o limite
vai dar $\frac{1}{1}$

$$\lim_{x \to \infty} \left[\frac{1}{2} \ln \left| \frac{\cancel{x}\left(1+\frac{3}{x}\right)}{\cancel{x}\left(1+\frac{5}{x}\right)} \right| - \frac{1}{2} \ln \left(\frac{3}{5} \right) \right]$$

$$= \frac{1}{2} \ln \left(\frac{1}{1} \right) - \frac{1}{2} \ln \left(\frac{3}{5} \right) = \frac{-\ln \left(\frac{3}{5} \right)}{2} \; //$$