s

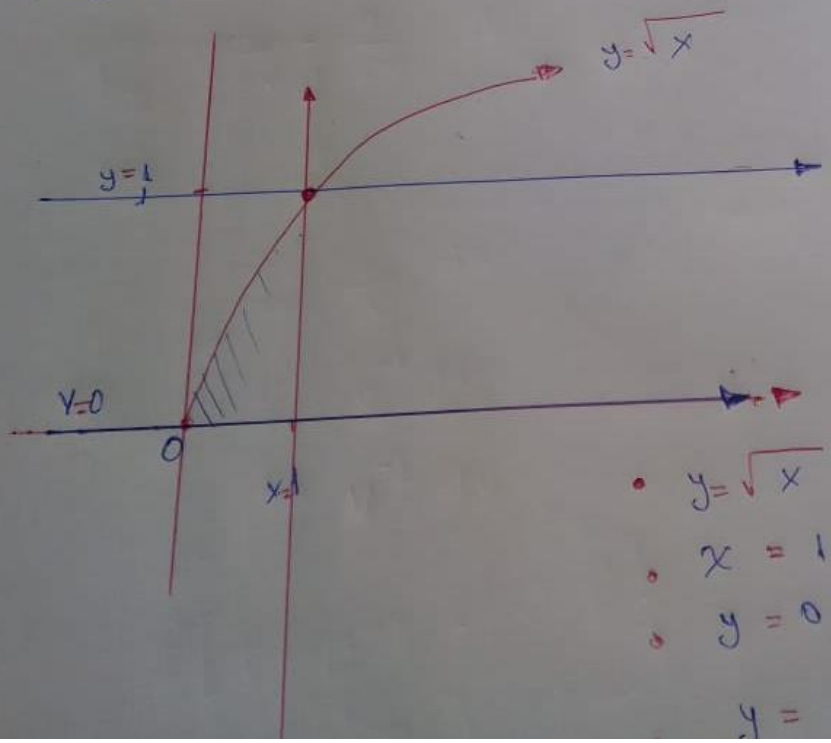
2) Calcule $\int_0^1 \int_{y^2}^1 y^3 \operatorname{sen}(x^3)\, dx\, dy$

$x = y^2$

$y = \sqrt{x}$

:> Grafico:

-> Haremos un cambio de variable debido a la dificultad de la integral de la expresión trigonometrica.



- $y = \sqrt{x}$
- $x = 1$
- $y = 0$

$y = 1$

$$\int_0^1 \int_0^{\sqrt{x}} y^3 \operatorname{sen}(x^3)\, dy\, dx$$

$$\int_0^1 \left. \frac{\operatorname{sen}(x^3)\, y^4}{4} \right|_0^{\sqrt{x}} dx$$

$$\int_0^1 \frac{\operatorname{sen}(x^3) \cdot x^2}{4} dx$$

$$\frac{1}{4} \cdot \frac{1}{3} \int_0^1 \operatorname{sen}(x^3) \cdot 3x^2 dx$$

$$\frac{1}{12} \int_0^1 \operatorname{sen} u \, du$$

$$\frac{1}{12} \left(-\cos(x^3)\right)\Big|_0^1$$

$$\frac{1}{12} \left[-\cos(1) + \cos(0)\right]$$

$$\frac{1}{12} \left[1 - \cos(1)\right]$$

$$\int_0^1 \int_{y^2}^1 y^3 \operatorname{sen} x^3 \, dx\, dy = \frac{(1 - \cos(1))}{12}$$

//