Laboratorio # 7 Nombre ¿? 2019-09-15

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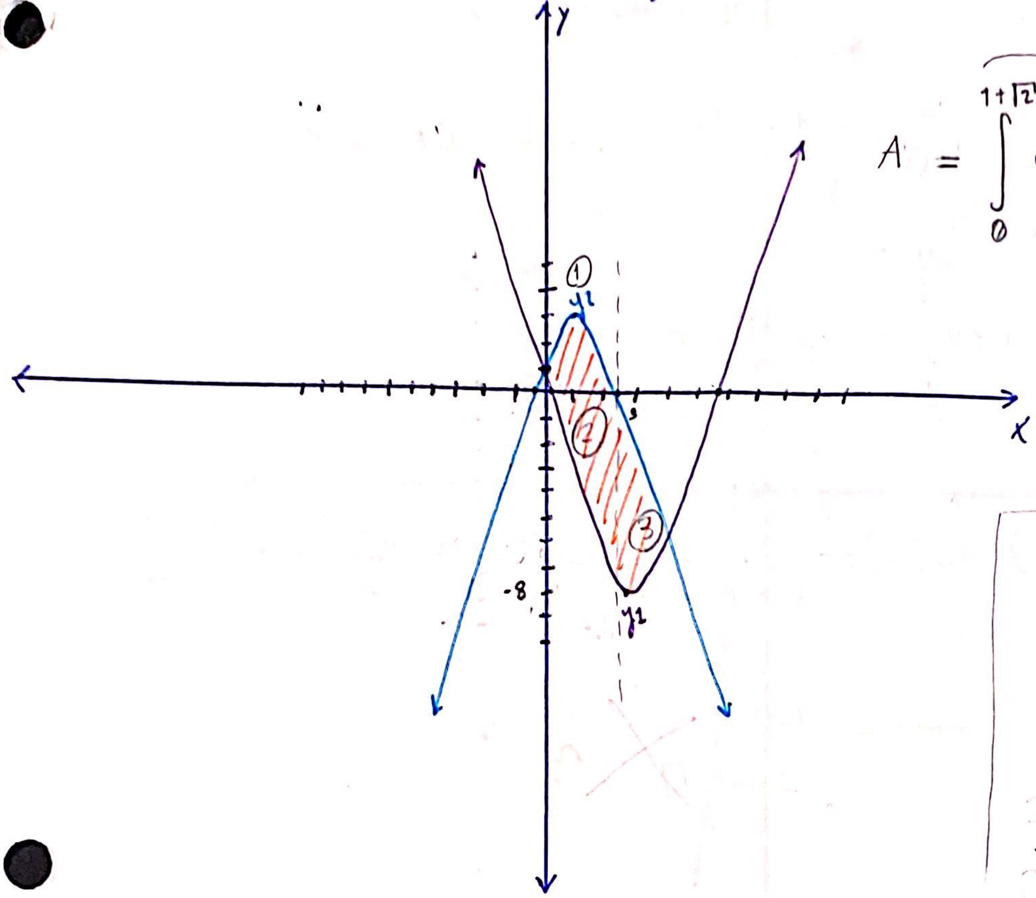
① a.1) $y_1 = x^2 - 6x + 1$, $y_2 = -x^2 + 2x + 1$



$$A = \overbrace{\int_0^{1+\sqrt{2}} y_2 - y_1 \, dx}^{1,\,2} + \overbrace{\int_{1+\sqrt{2}}^{4} y_2 - y_1 \, dx}^{3}$$

¿cuando interseca y_1 & y_2?

$x^2 - 6x + 1 = -x^2 + 2x + 1$

$x^2 + x^2 - 6x - 2x + 1 - 1 = 0$

$2x^2 - 8x = 0$

$2x(x-4) = 0$

$\underline{x = 0}$ $\underline{x = 4}$

intersecan en $x = 0$ & $x = 4$

I-en-x de y_2

$y = 0$

$0 = -x^2 + 2x + 1$

$a = -1$ $b = 2$ $c = 1$

$x = \dfrac{-2 \pm \sqrt{4 - 4(-1)(1)}}{2(-1)}$

$x = \dfrac{-2 \pm \sqrt{4+4}}{-2}$

$x = \dfrac{-2 \pm \sqrt{8}}{-2}$

$\boxed{x_1 \cong -0.41}$ $\boxed{x_2 \cong 2.41}$

vértice y_1

$2x - 6 = 0$

$x = \frac{6}{2} = 3$

$y_1(3) = 3^2 - 18 + 1$

$= 9 - 18 + 1$

$= -9 + 1 = -8$

$(3, -8)$

I-en-x ⇒ $y = 0$ de y_1

$0 = x^2 - 6x + 1$

$a = 1$ $b = -6$ $c = 1$

$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = \dfrac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(1)}}{2(1)}$

$x = \dfrac{6 \pm \sqrt{36 - 4}}{2} = \dfrac{6 \pm \sqrt{32}}{2}$

$x_1 \cong 5.828$ $x_2 = 0.172$

Vértice y_2

$-2x + 2 = 0$

$2(-x+1) =$

$-x = -1$

$x = 1$

eval:

$-(1)^2 + 2 + 1$

$-1 + 3$

2

$(1, 2)$

I-en-y ⇒ $x = 0$ de y_1

$\cancel{0^2} - \cancel{6(0)} + 1 = y$

$I_y = 1$

$(0, 1)$

a.2) $A = \int_0^4 (-x^2+2x+1)-(x^2-6x+1)\,dx$

$y_1 = x^2 - 6x + 1$

$y_2 = -x^2 + 2x + 1$

$$= \int_0^4 -x^2+2x+1-x^2+6x+2\,dx = \int_0^4 -2x^2+8x+3\,dx$$

$$= -\frac{2}{3}x^3 + \frac{8}{2}x^2 + 3x\Big]_0^4 = -\frac{2}{3}x^3 + 4x^2 + 3x\Big]_0^4 =$$

a.3)

$$= \left\{-\frac{2}{3}(4)^3 + 4(4)^2 + 3(4)\right\} - \{0\} = \left\{-\frac{64\cdot 2}{3} + \frac{64\cdot 3}{3} + \frac{12\cdot 3}{3}\right\}$$

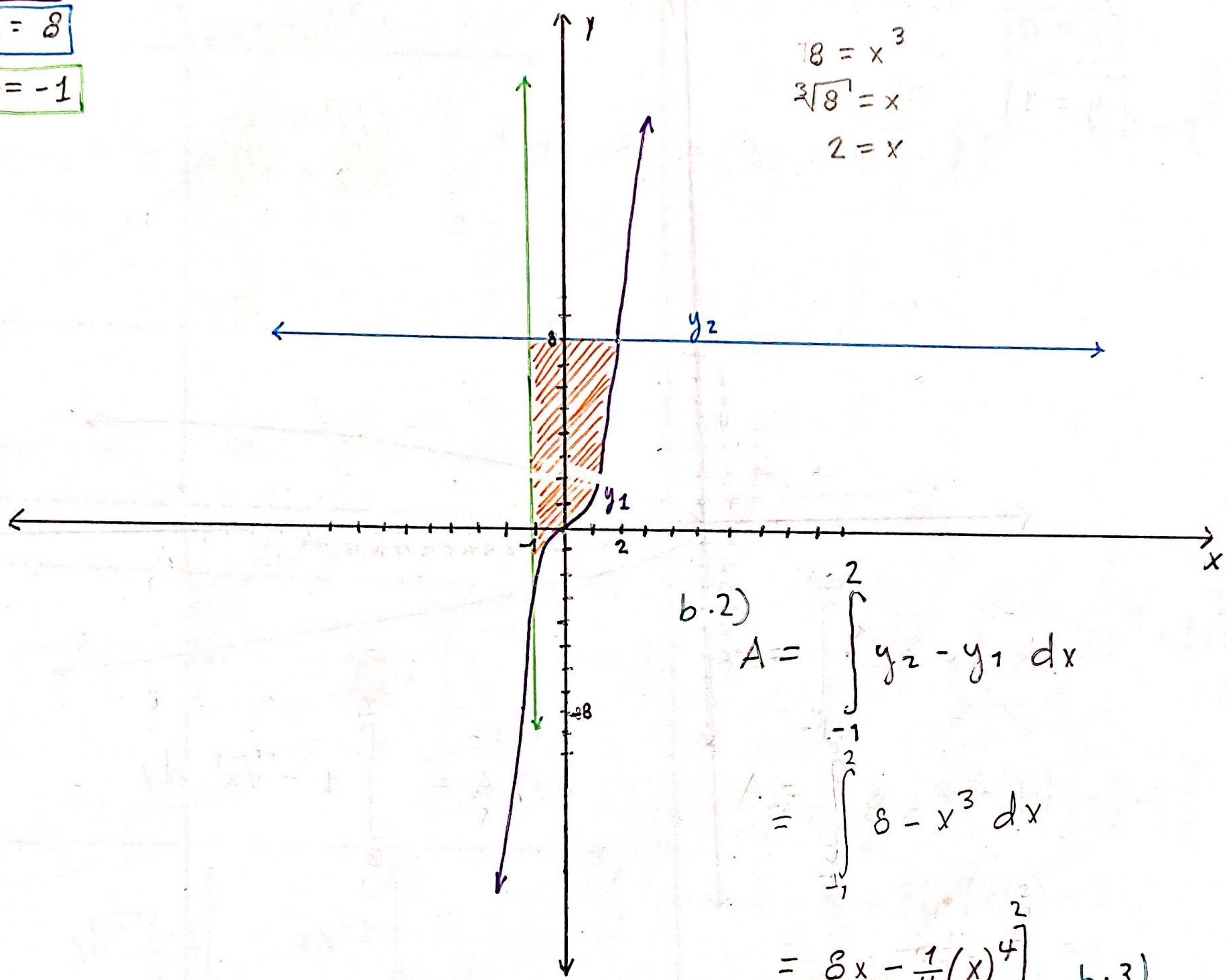
$$= \frac{-128+192+36}{3} = \frac{100}{3}$$

3

b.1) $\boxed{y_1 = x^3}$

$\boxed{y_2 = 8}$

$\boxed{x = -1}$



$8 = x^3$

$\sqrt[3]{8} = x$

$2 = x$

b.2)

$$A = \int_{-1}^{2} y_2 - y_1 \, dx$$

$$= \int_{-1}^{2} 8 - x^3 \, dx$$

$$= 8x - \frac{1}{4}(x)^4 \Big]_{-1}^{2}$$

b.3)

b.3)

$$= \left\{8(2) - \frac{1}{4}(2)^4\right\} - \left\{-8 - \frac{1}{4}\right\}$$

$$= \{12\} - \left\{-\frac{33}{4}\right\}$$

$$= 12 + \frac{33}{4} = \frac{81}{4} = 20.25$$

c.1) $\boxed{x_1 = y^2}$ $\boxed{x_2 = \emptyset}$ $\boxed{y = 1}$

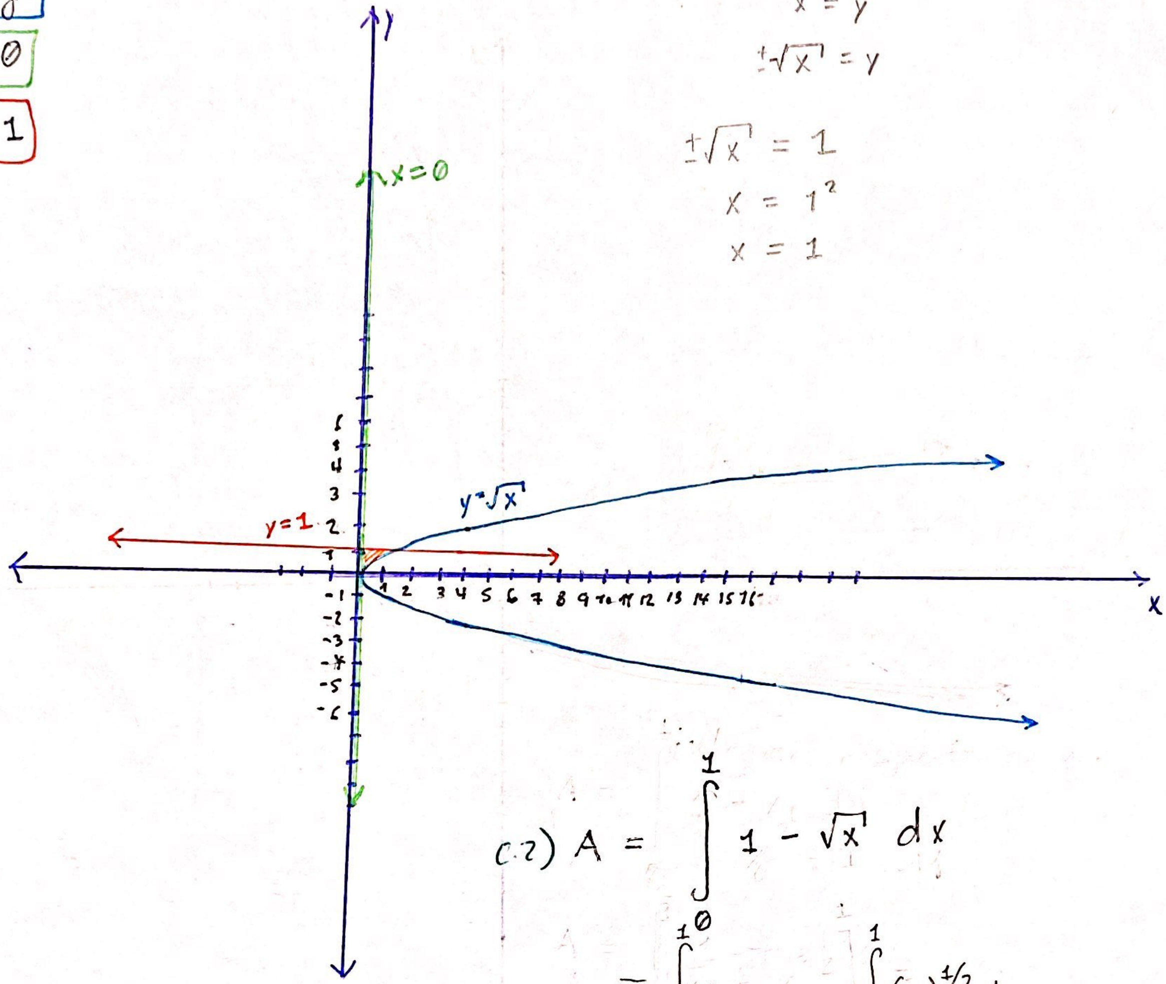
$x = y^2$

$\pm\sqrt{x} = y$

$\pm\sqrt{x} = 1$

$x = 1^2$

$x = 1$



$$c.2)\ A = \int_{\emptyset}^{1} 1 - \sqrt{x}\, dx$$

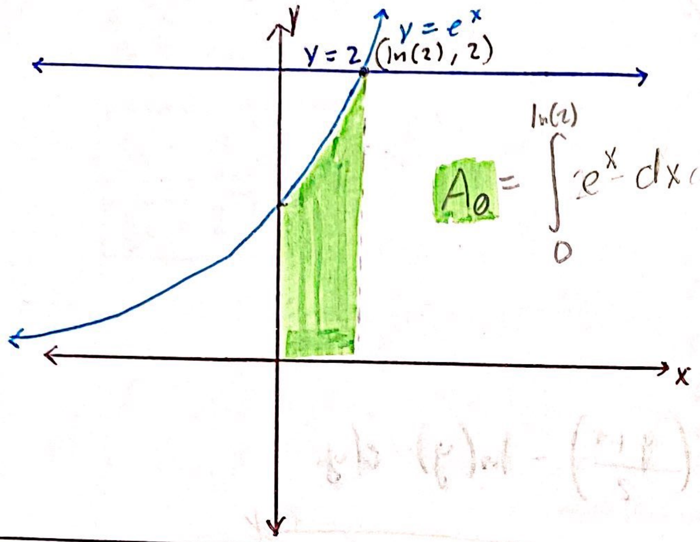
$$= \int_{\emptyset}^{1} 1\, dx - \int_{\emptyset}^{1} (x)^{1/2} dx$$

$$= x - \frac{2x^{\frac{3}{2}}}{3} \Big]_{0}^{1}$$

$$= \left\{1 - \frac{2}{3}(1)^{3/2}\right\} \cancel{-} \left\{0\right\}$$

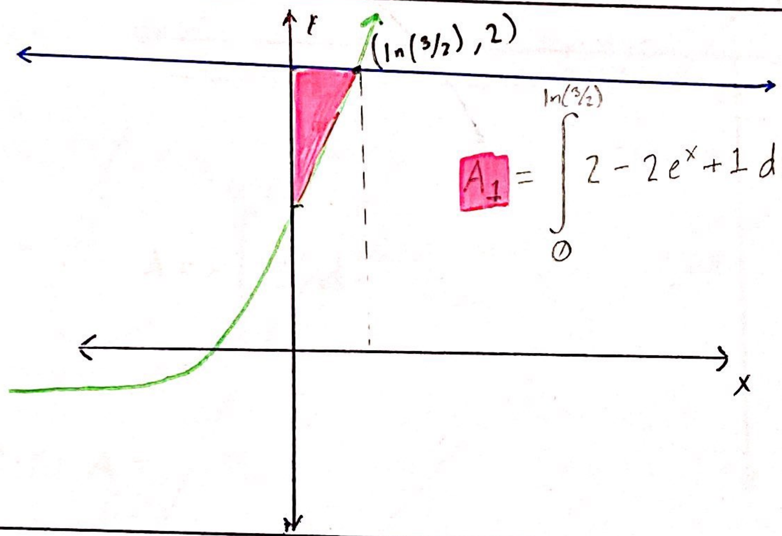
$$c.3) = \frac{1}{3} \times \square$$

②



$$A_0 = \int_0^{\ln(2)} e^x\,dx$$

$$A_0 = e^x \Big]_0^{\ln(2)} = \{2\} - \{1\} = 2 - 1 = \boxed{1}$$



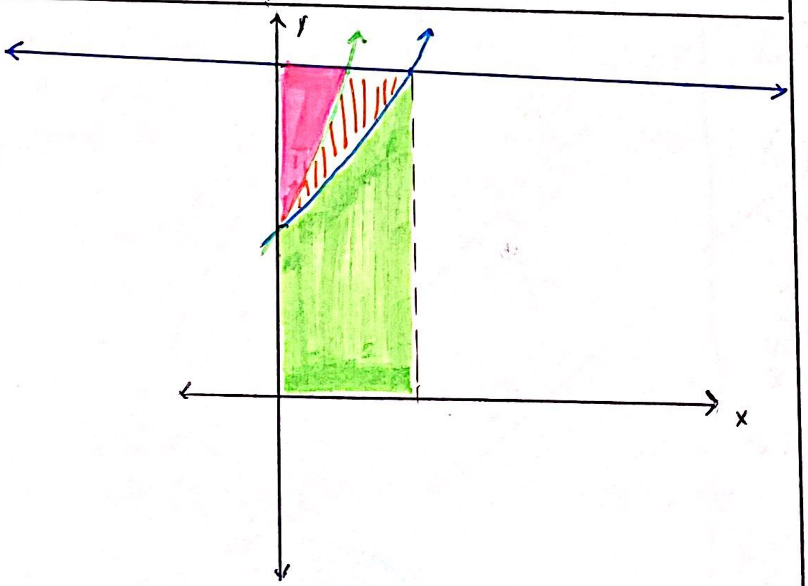
$$A_1 = \int_0^{\ln(3/2)} 2 - 2e^x + 1\,dx$$

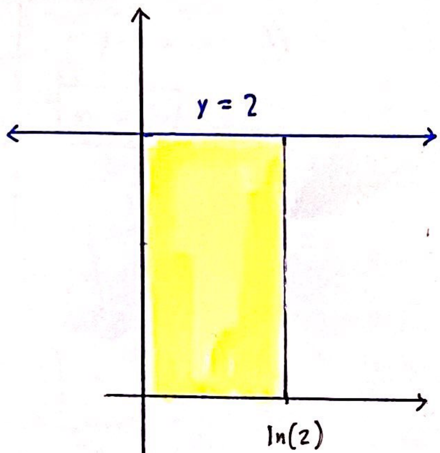
$$A_1 = \int_0^{\ln(3/2)} -2e^x + 3 = -2e^x + 3x \Big]_0^{\ln(3/2)}$$

$$= \left\{-\cancel{2}\cdot\frac{3}{\cancel{2}} + 3\ln(3/2)\right\} - \{-2\}$$

$$= -3 + 3\ln(3/2) + 2$$

$$= \boxed{3\ln(3/2) - 1}$$





Ésta es el área total:

$$A_T = \int_0^{\ln(2)} 2 = 2x \Big]_0^{\ln(2)} = \{2\ln(2)\}$$

$$\boxed{2\ln(2)} \approx 1.38$$

$$A_T - A_0 - A_1 = A$$

$$A = 2\ln(2) - 1 - 3\ln(3/2) + 1$$

$$A = 2\ln(2) - 3\ln(3/2)$$

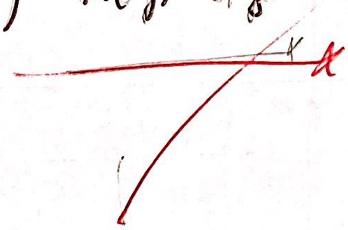
$$y = 2e^x - 1 \ ; \ y = e^x \ ; \ y = 2$$

$$y + 1 = 2e^x \qquad \boxed{\ln(y) = x}$$

$$\frac{y+1}{2} = e^x$$

$$\boxed{\ln\left(\frac{y+1}{2}\right) = x}$$

$$A = \int_0^2 \ln\left(\frac{y+1}{2}\right) - \ln(y) \, dy$$

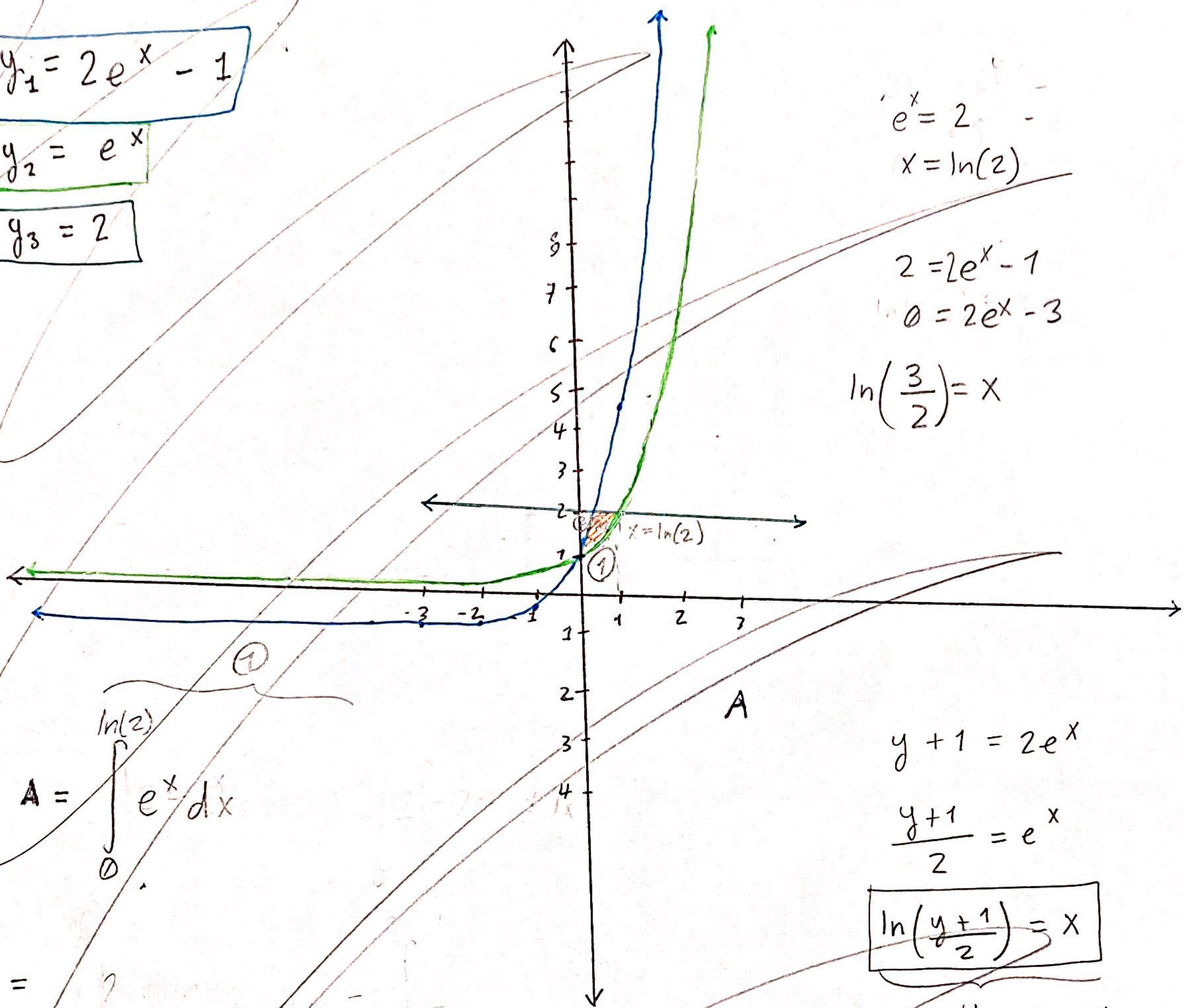


2

$\boxed{y_1 = 2e^x - 1}$

$\boxed{y_2 = e^x}$

$\boxed{y_3 = 2}$



$e^x = 2$

$x = \ln(2)$

$2 = 2e^x - 1$

$0 = 2e^x - 3$

$\ln\left(\frac{3}{2}\right) = x$

2. b) $A = \overbrace{\int_0^{\ln(2)} e^x \, dx}^{1}$

2. c) $A =$

$y + 1 = 2e^x$

$\frac{y+1}{2} = e^x$

$\underbrace{\boxed{\ln\left(\frac{y+1}{2}\right) = x}}_{y_1 \text{ osea } x_1}$

$\underbrace{\boxed{\ln(y) = x}}_{y_2 \text{ osea } x_2}$

$\boxed{y = 2}$

límite e^x con 2

$x_2 = x_3$

$\ln(y) = 2$

$e^{\ln(y)} = e^2$

$y = e^2$

lím de sustracción

$x_1 = x_3$

$\ln\left(\frac{y+1}{2}\right) = 2$

$\ln(y+1) - \ln(2) = 2$

$\ln(y+1) = 2 + \ln(2)$

$y = e^{2+\ln(2)} - 1$

$y = 2e^2 - 1$

③

$y_1 = \sin(x)$

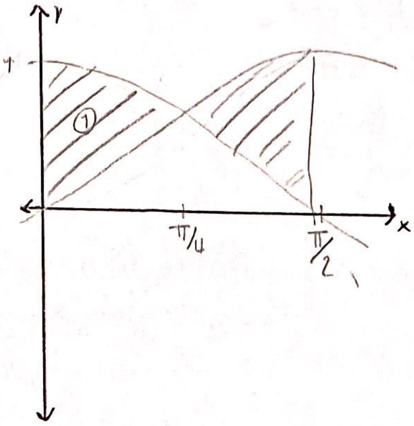
$y_2 = \cos(x)$

$x = \emptyset$

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

$$A_1 = \overbrace{\int_0^{\pi/4} \cos(x) - \sin(x)\,dx}^{①}$$

$$A_2 = \int_{\pi/4}^{\pi/2} \sin(x) - \cos(x)\,dx$$



$$A_1 = \sin(x) + \cos(x)\Big]_0^{\pi/4}$$

$$A_1 = \left\{\left(\frac{\sqrt{2}}{2}\right)2\right\} - \{1\}$$

$$A_1 = \{\sqrt{2} - 1\}$$

$\sin(x) = \cos(x)$

$\sin(\pi/4) = \cos(\pi/4)$

$\frac{\sqrt{2}}{2} = \frac{\sqrt{2}}{2}$

$$A_2 = -\cos(x) - \sin(x) \quad \pi/2$$

$$A_2 = -(\cos(x) + \sin(x))\Big]_{\pi/4}^{\pi/2}$$

$$A_T = \sqrt{2} - 1 + (-1 + \sqrt{2}) \qquad = \{-(0 + 1)\} - \{-(\sqrt{2})\}$$

$$\sqrt{2} - 1 - 1 + \sqrt{2} \qquad = -1 + \sqrt{2}$$

$$\sqrt{2} - 2 + \sqrt{2}$$

$$-2 + \sqrt{2} + \sqrt{2}$$

$$\underline{-2 + 2\sqrt{2}} \cong 0.82$$