data

6.2) 7)

$$\int\left(\sqrt{2x}-\frac{1}{\sqrt{2x}}\right)dx$$

$$\int\left(\sqrt{2}.x^{\frac{1}{2}}-\frac{1}{\sqrt{2}}.x^{-\frac{1}{2}}\right)dx=\frac{\sqrt{2}x^{\frac{3}{2}}}{\frac{3}{2}}-\frac{1}{\sqrt{2}}.\frac{x^{\frac{1}{2}}}{\frac{1}{2}}+c$$

$$\frac{2\sqrt{2}}{3}x^{\frac{3}{2}}-\frac{2}{\sqrt{2}}.x^{\frac{1}{2}}+c=\sqrt{2x}\left(\frac{2}{3}x-1\right)+c$$

$$\frac{d}{dx}\left(\frac{2\sqrt{2}}{3}x^{\frac{3}{2}}-\frac{2}{\sqrt{2}}.x^{\frac{1}{2}}+c\right)=\frac{2\sqrt{2}}{3}.\frac{3}{2}x^{\frac{1}{2}}-\frac{2}{\sqrt{2}}.\frac{1}{2}x^{-\frac{1}{2}}=\sqrt{2}x^{\frac{1}{2}}-\frac{1}{\sqrt{2}}x^{-\frac{1}{2}}$$

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

10) $\int\frac{x^5+2x^2-1}{x^4}\,dx$

$$\int(x+2x^{-2}-x^{-4})dx=\frac{x^2}{2}+2\frac{x^{-1}}{-1}-\frac{x^{-3}}{-3}+c=\frac{x^2}{2}-\frac{2}{x}+\frac{1}{3x^3}+c$$

$$\frac{d}{dx}\left(\frac{x^2}{2}-\frac{2}{x}+\frac{1}{3x^3}+c\right)=\frac{2x}{2}-\frac{-2}{x^2}+\frac{-1.9x^2}{9x^6}=x+\frac{2}{x^2}-\frac{1}{x^4}$$

$$=\frac{x^5+2x^2-1}{x^4}$$

17) $\int\left(\frac{e^t}{2}+\sqrt{t}+\frac{1}{t}\right)dt$

$$\frac{1}{2}e^t+\frac{t^{\frac{3}{2}}}{\frac{3}{2}}+\ln|t|+c=\frac{1}{2}e^t+\frac{2}{3}t^{\frac{3}{2}}+\ln|t|+c$$

36) $f'(x) + \text{sen } x = 0$

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

$\int -\text{sen } x \, dx = +\cos x + c$

$f(x) = +\cos x + c$

$f(0) = \cos 0 + c = 2 \qquad c = 2 - 1 = 1$

$\therefore f(x) = \cos x + 1$

64) 2) $\int (x^3-2)^{1/7} x^2 \, dx$

$u = x^3 - 2 \qquad du = 3x^2 \, dx$

$\int (x^3-2)^{1/7} x^2 \, dx = \frac{1}{3} \frac{(x^3-2)^{8/7}}{\frac{8}{7}} + c$

$\frac{7}{24} (x^3-2)^{8/7} + c$

6) $\int (e^{2t}+2)^{1/3} e^{2t} \, dt$

$u = e^{2t}+2 \qquad du = 2e^{2t} \, dt$

$\int (e^{2t}+2)^{1/3} e^{2t} \, dt = \frac{1}{2} \frac{(e^{2t}+2)^{4/3}}{\frac{4}{3}} + c$

$\frac{3}{8} (e^{2t}+2)^{4/3} + c$

8) $\int \frac{e^{1/x}+2}{x^2} \, dx$

$\int e^{\frac{1}{x}} \frac{1}{x^2} \, dx + \int 2x^{-2} \, dx = -e^{\frac{1}{x}} + 2 \cdot \frac{x^{-1}}{-1} + c = -e^{\frac{1}{x}} - \frac{2}{x} + c$

$u = e^{\frac{1}{x}}$

$du = e^{\frac{1}{x}} \cdot \frac{-1}{x^2}$

10) $\int \text{sen}^4 x \cos x \, dx$

$u = \text{sen } x$

$du = \cos x \, dx \qquad = \frac{\text{sen}^5 x}{5} + c$

data

20) $\int \sqrt[3]{\text{sen}\,\theta}\;\cos\theta\, d\theta$

$\int (\text{sen}\,\theta)^{1/3} \cos\theta\, d\theta = \dfrac{(\text{sen}\,\theta)^{4/3}}{\frac{4}{3}} + c = \dfrac{3}{4}\,\text{sen}^{\frac{4}{3}}\theta + c$

31) $\int x\, e^{3x^2}\, dx \qquad \frac{1}{6} e^{3x^2} + c$

$u = 3x^2$

$du = 6x\, dx$

6.6) 2) $\int \ln(1-x)\, dx$

$u = \ln(1-x) \Rightarrow du = \dfrac{-1}{1-x}\, dx$

$dv = dx \Rightarrow v = x$

$I = \ln(1-x)\, x - \int x \dfrac{-1}{1-x}\, dx$

$I = x \ln(1-x) + \int \left(-1 + \dfrac{1}{1-x}\right) dx$

$I = x \ln(1-x) - x - \ln(1-x) + c$

$I = (x-1)\ln(1-x) - x + c$

4) $\int (x+1)\cos 2x\, dx$

$u = x+1 \Rightarrow du = dx$

$dv = \cos 2x\, dx$

$v = \int \cos 2x\, dx = \frac{1}{2}\,\text{sen}\, 2x$

$I = (x+1)\frac{1}{2}\,\text{sen}\, 2x - \int \frac{1}{2}\,\text{sen}\, 2x\, dx$

$\dfrac{x+1}{2}\,\text{sen}\, 2x + \dfrac{1}{4}\cos 2x + c$

6) $\int \cos^3 x\, dx$

$u = \cos^2 x \qquad du = -2\cos x \cdot \text{sen}\, x\, dx$

$dv = \cos x\, dx \qquad v = \int \cos x\, dx = \text{sen}\, x$

$I = \cos^2 x \cdot \text{sen}\, x - \int \text{sen}\, x\,(-2)\cos x\; \text{sen}\, x\, dx$

$\cos^2 x \cdot \text{sen}\, x + 2\int \text{sen}^2 x \cos x\, dx$

$\cos^2 x \cdot \text{sen}\, x + 2\dfrac{\text{sen}^3 x}{3} + c$

data

7) $\int e^x \cos \frac{x}{2}\, dx$

$u = e^x \quad du = e^x dx$

$dv = \cos \frac{x}{2}\, dx \quad v = \int \cos \frac{x}{2}\, dx = 2 \operatorname{sen} \frac{x}{2}$

$I = e^x 2 \operatorname{sen} \frac{x}{2} - \int 2 \operatorname{sen} \frac{x}{2}\, e^x dx$

$u = e^x \quad du = e^x dx$

$dv = \operatorname{sen} \frac{x}{2}\, du \quad v = -2 \cos \frac{x}{2}$

$I = 2e^x \operatorname{sen} \frac{x}{2} - 2 \left[e^x (-2) \cos \frac{x}{2} - \int -2 \cos \frac{x}{2}\, e^x dx \right]$

$2e^x \operatorname{sen} \frac{x}{2} + 4e^x \cos \frac{x}{4} - 4I$

$5I = 2e^x \operatorname{sen} \frac{x}{2} + 4e^x \cos \frac{x}{2}$

$\frac{1}{5}\left(2e^x \operatorname{sen} \frac{x}{2} + 4e^x \cos \frac{x}{2}\right) + C$

10) $\int x^2 \cos a x\, dx$

$u = x^2 \quad du = 2x\, dx$

$dv = \cos ax\, dx \quad v = \int \cos ax\, dx = \frac{1}{a} \operatorname{sen} ax$

$I = x^2 \cdot \frac{1}{a} \operatorname{sen} ax - \int \frac{1}{a} \operatorname{sen} ax \cdot 2x\, dx \quad I = \frac{x^2}{a} \operatorname{sen} ax - \frac{2}{a} \int x \operatorname{sen} ax\, dx$

$u = x \quad du = dx \quad dv = \operatorname{sen} ax\, dx \quad v = \frac{-1}{a} \cos ax$

$I = \frac{x^2}{a} \operatorname{sen} ax - \frac{2}{a} \left[x \cdot \frac{1}{a} \cos ax - \int \frac{-1}{a} \cos ax\, dx \right]$

data

$\frac{x^2}{a}$ sen $ax + \frac{2x}{a^2}$ cos $ax - \frac{2}{a^2}$ sen $ax \frac{1}{a} + c$

$\frac{x^2}{a}$ sen $ax + \frac{2x}{a^2}$ cos $ax - \frac{2}{a^3}$ sen $ax + c$

6. 11) (b)

$$\int_1^2 [2x(x+1)]\,dx = \int_1^2 (2x^2+2x)\,dx = 2\frac{x^3}{3} + 2\frac{x^2}{2}\Big]_1^2$$

$$2 \cdot \frac{7}{3} + 2 \cdot \frac{3}{2} = \frac{14}{3} + 3 = \frac{14+9}{3} = \frac{23}{3}$$

5c) $\int_2^3 (2x+1)\,dx$

$f(x) = 2x+1 \quad 2x+1 \geq 0 \quad 2x \geq -1$

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

$f(x) = 2x+1$ é positiva para $x \in [2, 3]$

12) $\int_{-1}^{2} x(1+x^3)\,dx \quad \int (x + x^4)\,dx \quad \frac{x^2}{2} + \frac{x^5}{5}\Big]_{-1}^{2} = 2 + \frac{32}{5} - \frac{1}{2} + \frac{1}{5}$

$\frac{81}{10}$

17) $\int_{\frac{\pi}{4}}^{\frac{3\pi}{4}}$ sen x cos $x\,dx$

$$\frac{\operatorname{sen}^2 x}{2}\Big]_{\frac{\pi}{4}}^{\frac{3\pi}{4}} = \frac{1}{2}\left(\frac{1}{2} - \frac{1}{2}\right) = 0$$

20) $\int_{-2}^{5} |2x-4|\, dx$

$\int_{-2}^{2} (-2x+4)\, dx + \int_{2}^{5} (2x-4)\, dx$

$\left(-2\frac{x^2}{2} + 4x\right)\Big]_{-2}^{2} + \left(2\frac{x^2}{2} - 4x\right)\Big]_{2}^{5}$

$-4+8+4+8+25-20-4+8 = 25$

6.13 2) $y^2 = 2x$ e $x^2 = 2y$

$A_1 = \int_0^2 \sqrt{2x}\, dx = \sqrt{2}\, \frac{x^{3/2}}{3/2}\Big]_0^2 \quad \sqrt{2}\, \frac{2}{3}\sqrt{2^3} = \frac{8}{3}$

$A_2 = \int_0^2 \frac{x^2}{2}\, dx = \frac{1}{2} \cdot \frac{x^3}{3}\Big]_0^2 = \frac{1}{6}(2)^3 = \frac{8}{6}$

$A = A_1 - A_2 = \frac{8}{3} - \frac{8}{6} = \frac{4}{3}$ u.a

3) $y = 5 - x^2$ e $y = x+3$

$5 - x^2 = x+3$

$x^2 + x - 2 = 0$

$x = \frac{-1 \pm \sqrt{1+8}}{2}$

$x' = \frac{-1+3}{2} = 1$

$x'' = \frac{-1-3}{2} = -2$

$A_1 = \int_{-2}^{1} (5-x^2)\, dx = 5x - \frac{x^3}{3}\Big]_{-2}^{1} = 5(1+2) - \frac{1}{3}(1+8)$

$= 15 - 3 = 12$

$A_2 = \int_{-2}^{1} (x+3)\, dx = \frac{x^2}{2} + 3x\Big]_{-2}^{1} = \frac{1}{2}(1-4) + 3(1+2)$

$= \frac{1}{2} \cdot (-3) + 3 \cdot 3$

$= \frac{-3}{2} + 9 = \frac{-3+18}{2} = \frac{15}{2}$

$A = 12 - \frac{15}{2} = \frac{24-15}{2} = \frac{9}{2}$ u.a

8) $y = x^3 - x$ e $y = 0$

$$A = 2\int_{-1}^{0} (x^3 - x)\,dx = 2\left[\frac{x^4}{4} - \frac{x^2}{2}\right]_{-1}^{0}$$

$$2\left(\frac{-1}{4} + \frac{1}{2}\right) = \frac{1}{2} \text{ u.a}$$

(17) $y = e^x$, $x = 0$, $x = 1$, $y = 0$

$$\int_0^1 e^x\,dx = e^x\Big]_0^1 = e - 1 \text{ u.a}$$

$$A = e - 1 - \frac{1}{2} = e - \frac{3}{2} \text{ u.a}$$

(17) $y = e^x$, $y = x + 1$ e $x = -1$

$$A_1 = \int_{-1}^{0} e^{-x}\,dx = -e^{-x}\Big]_{-1}^{0} = -1 + e$$

$$A_2 = \int_{-1}^{0} (x+1)\,dx = \frac{x^2}{2} + x\Big]_{-1}^{0} = -\frac{1}{2} + 1 = \frac{1}{2}$$

23) $y = 4 - x^2$ e $y = x^2 - 14$

$$A = 2\int_0^3 [(4 - x^2) - (x^2 - 14)]\,dx = 2\int_0^3 (18 - 2x^2)\,dx = 2\left(18x - \frac{2x^3}{3}\right)\Big]_0^3$$

$$2(54 - 18) = 72$$

29) $y = e^x - 1$, $y = -x$ e $x = 1$

$$\int_0^1 (e^x - 1)\,dx = e^x - x\Big]_0^1 = e - 1 - 1 = e - 2$$

$$-\int_0^1 -x\,dx = \frac{x^2}{2}\Big]_0^1 = \frac{1}{2}$$

$$A = e - 2 + \frac{1}{2} = \frac{2e - 4 + 1}{2} = \frac{2e - 3}{2} \text{ u.a}$$

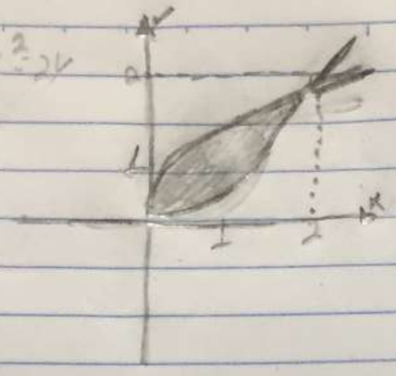
30) S1 $A_1 = \int_0^1 x\,dx = \frac{x^2}{2} = \frac{1}{2}$ $\quad A_2 = \int_1^2 \frac{1}{x}\,dx = \ln x\Big|_1^2 = \ln 2$

$$A_3 = \int_0^2 \frac{x}{4}\,dx = \frac{1}{4}\cdot\frac{x^2}{2}\Big]_0^2 = \frac{1}{8}\cdot 4 = \frac{1}{2}$$

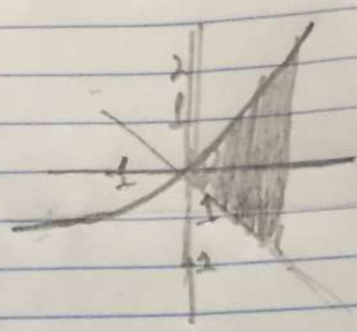
S1: $A = \frac{1}{2} + \ln 2 - \frac{1}{2} = \ln 2$

data

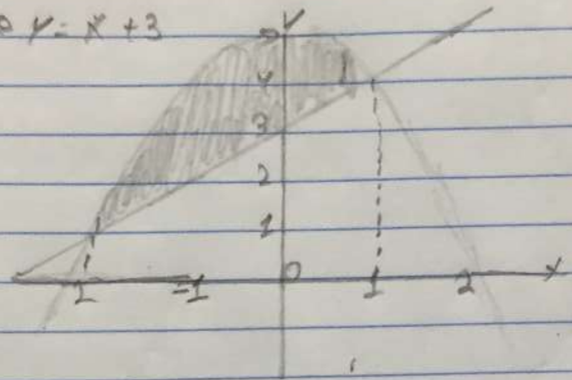
2) $y^2 = 2x$ e $x^2 = 2y$



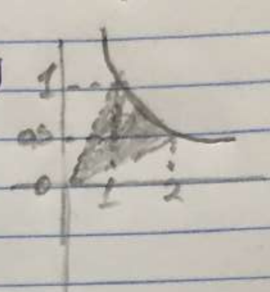
29) $y = e^x - 1$, $y = -x$ e $x = 1$



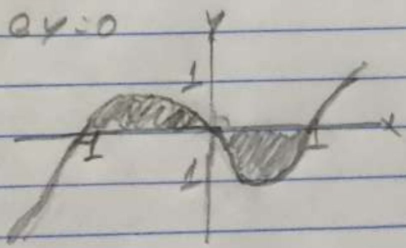
3) $y = 5 - x^2$ e $y = x + 3$



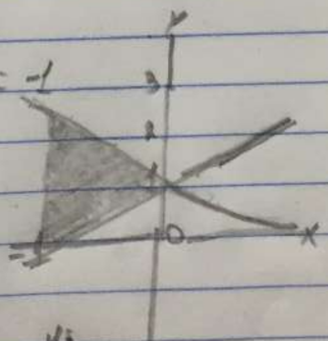
30)



8) $y = x^3 - x$ e $y = 0$



17) $y = e^{-x}$, $y = x + 1$ e $x = -1$



23) $y = 4 - x^2$ e $y = x^2 - 14$