funciones primitivas

M00 P1

$$f(x) = \int \cos x \, dx = \sin x + C$$

$$f(\pi/2) = -2 \longrightarrow -2 = \sin \pi/2 + C \; ; \quad C = -3 \quad \Rightarrow \boxed{f(x) = \sin x - 3}$$

N00 P1

a) $f'(x) = 3(2x+5)\cdot 2 = \boxed{12x + 30}$

b) $\int (2x+5)^3 dx = \frac{1}{2} \frac{(2x+5)^4}{4} = \boxed{\frac{(2x+5)^4}{8} + C}$

M01 P1

a) $\int \sin(3x+7) dx = \boxed{-\frac{1}{3} \cos(3x+7) + C}$

b) $\int e^{-4x} dx = \boxed{\frac{1}{-4} e^{-4x} + C}$

N00 P1

$$f(x) = \int (-2x+3) dx = -x^2 + 3x + C$$

$$f(1) = 1 \longrightarrow 1 = -1 + 3 + C \; ; \quad C = -1 \quad \Rightarrow \boxed{f(x) = -x^2 + 3x - 1}$$

N01 P1

$$f(x) = 2 \sin(5x - 3)$$

a) $f'(x) = 2 \cdot \cos(5x-3) \cdot 5 = \boxed{10 \cos(5x-3)}$

b) $\int 2 \sin(5x-3) dx = \boxed{-\frac{2}{5} \cos(5x-3) + C}$

N02 P1

$$f(x) = \sqrt{x^3} = x^{3/2}$$

a) $f'(x) = \frac{3}{2} x^{3/2 - 1} = \frac{3}{2} x^{1/2} = \boxed{\frac{3}{2}\sqrt{x}}$

b) $\int x^{3/2} dx = \frac{x^{3/2+1}}{3/2+1} = \frac{x^{5/2}}{5/2} = \boxed{\frac{2}{5}\sqrt{x^5} + C}$

M02 P1

$$f(x) = \int \left(\frac{1}{x+1} - 0'5 \sin x\right) dx = \ln(x+1) + 0'5 \cos x + C$$

$$f(0) = 2 \longrightarrow 2 = \ln 1 + 0'5 \cos 0 + C \; ; \quad 2 = 0 + 0'5 + C \; ; \quad C = 1'5 \quad \Rightarrow \boxed{f(x) = \ln(x+1) + 0'5 \cos x + 1'5}$$

N03 P1

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

$$\begin{matrix} x = 2 \\ y = 13 \end{matrix} \Big| \longrightarrow 13 = \frac{16}{4} + 4 - 2 + C \; ; \quad C = 7 \quad \Rightarrow \boxed{y = \frac{x^4}{4} + x^2 - x + 7}$$

M04 P1

a) $\frac{d}{dx}(3x^4 - 5x + 1) = \boxed{12x^3 - 5}$

b) $\int (3x^4 - 5x + 1) dx = \boxed{\frac{3x^5}{5} - \frac{5x^2}{2} + x + C}$

N04 P1

$$f(x) = \int \left(e^{-2x} + \frac{1}{1-x}\right) dx = \frac{1}{-2} e^{-2x} - \ln(1-x) + C$$

$$f(0) = 4 \longrightarrow 4 = -\frac{1}{2} e^0 - \ln 1 + C \; ; \quad C = 9/2 \quad \Rightarrow \boxed{f(x) = -\frac{1}{2} e^{-2x} - \ln(1-x) + \frac{9}{2}}$$

M05 P1

$$y = \int (3x^2 - 5) = x^3 - 5x + C$$

$$\begin{matrix} x = 2 \\ y = 6 \end{matrix} \Big| \longrightarrow 6 = 8 - 10 + C \; ; \quad C = 8 \quad \Rightarrow \boxed{y = x^3 - 5x + 8}$$

M05
P1

$f(x) = (3x+4)^5$

a) $f'(x) = 5(3x+4)^4 \cdot 3 = \boxed{15(3x+4)^4}$

b) $\int (3x+4)^5 dx = \frac{1}{3} \frac{(3x+4)^6}{6} = \boxed{\frac{1}{18}(3x+4)^6 + C}$

Muestra
06/08
P1

a) $f(x) = 2\sin(5x-3)$

$f'(x) = 2\cos(5x-3) \cdot 5 = 10\cos(5x-3)$

$f''(x) = -10\sin(5x-3) \cdot 5 = \boxed{-50\sin(5x-3)}$

b) $\int 2\sin(5x-3)dx = \boxed{-\frac{2}{5}\cos(5x-3) + C}$

M07
P1

$f(x) = \int (12x^2 - 2)dx = 4x^3 - 2x + C$ $\rightarrow$ $\boxed{f(x) = 4x^3 - 2x + 3}$

$f(-1) = 1 \rightarrow 1 = -4 + 2 + C \;;\; C = 3$

N10
P1 #6

$f(x) = \int \sin(2x-3)dx = -\frac{1}{2}\cos(2x-3) + C$ $\rightarrow$ $\boxed{f(x) = -\frac{1}{2}\cos(2x-3) + \frac{9}{2}}$

$f(3/2) = 4 \rightarrow 4 = -\frac{1}{2}\cos 0 + C \;;\; C = 9/2$

M11
TZ2
P2 #7

$y = \int (10e^{2x} - 5)dx = 5e^{2x} - 5x + C$ $\rightarrow$ $\boxed{y = 5e^{2x} - 5x + 3}$

$\left.\begin{matrix} x=0 \\ y=8 \end{matrix}\right| \rightarrow 8 = 5e^0 - 0 + C \;;\; C = 3$

N11
P1 #4

$f(x) = \int (3x^2+2)dx = x^3 + 2x + C$ $\rightarrow$ $\boxed{f(x) = x^3 + 2x - 7}$

$f(2) = 5 \rightarrow 5 = 8 + 4 + C \;;\; C = -7$

M13
TZ1
P1 #6

$f(x) = \int \frac{12}{2x-5}dx = 6\ln(2x-5) + C$ $\rightarrow$ $f(x) = 6\ln(2x-5) - 6\ln 3 =$

$f(4) = 0 \rightarrow 0 = 6\ln 3 + C \;;\; C = -6\ln 3$

$= \boxed{6\ln\left(\frac{2x-5}{3}\right)}$

N13
P2 #3

$f(x) = \sqrt[3]{x^4} - \frac{1}{2} = x^{4/3} - 1/2$

a) $f'(x) = \frac{4}{3} x^{\frac{4}{3}-1} - 0 = \frac{4}{3} x^{1/3} = \boxed{\frac{4}{3}\sqrt[3]{x}}$

b) $\int \left(x^{4/3} - \frac{1}{2}\right)dx = \frac{x^{4/3+1}}{4/3+1} - \frac{1}{2}x = \frac{3}{7}x^{7/3} - \frac{1}{2}x = \boxed{\frac{3}{7}\sqrt[3]{x^7} - \frac{1}{2}x + C}$

Muestra
14
P1 #5

a) $\int \frac{e^x}{1+e^x}dx = \boxed{\ln(1+e^x) + C}$

b) $\int \sin 3x \cos 3x\, dx = \frac{1}{3}\frac{\sin^2 3x}{2} = \boxed{\frac{1}{6}\sin^2 3x + C}$

<u>También</u>:

$\int \sin 3x \cdot \cos 3x\, dx = \frac{1}{2}\int \sin 6x\, dx = \boxed{-\frac{1}{12}\cos 6x + C}$

M14
TZ2
P1 #5

$h(x) = \int 4\cos 2x\, dx = 2\sin 2x + C$ $\rightarrow$ $\boxed{h(x) = 2\sin 2x + 4}$

$h\left(\frac{\pi}{12}\right) = 5 \rightarrow 5 = 2\sin\frac{\pi}{6} + C \;;\; 5 = 2\cdot\frac{1}{2} + C \;;\; C = 4$

Integrales Definidas

M02 P2

a) $\displaystyle\int_0^1 e^{-kx}\,dx = \left[\frac{1}{-k} e^{-kx}\right]_0^1 = -\frac{1}{k}e^{-k} + \frac{1}{k}e^0 = -\frac{1}{k}e^{-k} + \frac{1}{k} = \frac{1}{k}\left(1-e^{-k}\right)$ ✓

M03 P1

$\displaystyle\int_1^3 g(x)\,dx = 10$

a) $\displaystyle\int_1^3 \frac{1}{2}g(x)\,dx = \frac{1}{2}\int_1^3 g(x)\,dx = \frac{1}{2}\cdot 10 = \boxed{5}$

b) $\displaystyle\int_1^3 (g(x)+4)\,dx = \int_1^3 g(x)\,dx + \int_1^3 4\,dx = 10 + \left[4x\right]_1^3 = 10 + 12 - 4 = \boxed{18}$

N04 P1

$\displaystyle\int_0^3 f(x)\,dx = 8$

a) $\displaystyle\int_0^3 2f(x)\,dx = \boxed{16}$

$\displaystyle\int_0^3 (f(x)+2)\,dx = \int_0^3 f(x)\,dx + \int_0^3 2\,dx = 8 + \left[2x\right]_0^3 = 8+6 = \boxed{14}$

b) $\displaystyle\int_c^d f(x-2)\,dx = 8$

$x-2=t$

$x=c \rightarrow t=c-2$

$x=d \rightarrow t=d-2$

$\displaystyle \rightarrow \int_{c-2}^{d-2} f(t)\,dt = 8 \Rightarrow \begin{matrix} d-2=3 \\ c-2=0 \end{matrix} \quad \boxed{\begin{matrix} d=5 \\ c=2 \end{matrix}}$

M05 P1

a) $\displaystyle \frac{d}{dx}\left(f(x)+g(x)\right)_{(x=4)} = f'(4) + g'(4) = 7+4 = \boxed{11}$

b) $\displaystyle\int_1^3 (g'(x)+6)\,dx = \left[g(x)\right]_1^3 + \left[6x\right]_1^3 = g(3) - g(1) + 18 - 6 = 2 - 1 + 18 - 6 = \boxed{13}$

N05 P1

$\displaystyle\int_3^k \frac{1}{x-2}\,dx = \ln 7$

$\displaystyle\int_3^k \frac{1}{x-2}\,dx = \left[\ln(x-2)\right]_3^k = \ln(k-2) - \ln 1 = \ln(k-2) \Rightarrow k-2=7 \; ; \boxed{k=9}$

M07 P1

$\displaystyle\int_1^3 f(x)\,dx = 5$

a) $\displaystyle\int_1^3 2f(x)\,dx = 2\cdot 5 = \boxed{10}$

b) $\displaystyle\int_1^3 (3x^2+f(x))\,dx = \left[x^3\right]_1^3 + \int_1^3 f(x)\,dx = 27 - 1 + 5 = \boxed{31}$

M08 P1

$\displaystyle\int_1^5 3f(x)\,dx = 12 \longrightarrow \int_1^5 f(x)\,dx = 4$

a) $\displaystyle\int_5^1 f(x)\,dx = -\int_1^5 f(x)\,dx = -4$ ✓

b) $\displaystyle\int_1^2 (x+f(x))\,dx + \int_2^5 (x+f(x))\,dx = \int_1^5 (x+f(x))\,dx = \left[\frac{x^2}{2}\right]_1^5 + \int_1^5 f(x)\,dx = \frac{25}{2} - \frac{1}{2} + 4 = \boxed{16}$

M08 P1

a) $\int \frac{1}{2x+3}\,dx = \boxed{\frac{1}{2}\ln(2x+3) + c}$

b) $\int_0^3 \frac{1}{2x+3}\,dx = \left[\frac{1}{2}\ln(2x+3)\right]_0^3 = \frac{1}{2}\ln 9 - \frac{1}{2}\ln 3 = \frac{1}{2}\ln\left(\frac{9}{3}\right) = \frac{1}{2}\ln 3 = \ln 3^{1/2} =$

$= \ln\sqrt{3} \Rightarrow \boxed{P=3}$

M12 TZ1 P1 #6

$\int_0^5 \frac{2}{2x+5}\,dx = \left[\ln(2x+5)\right]_0^5 = \ln 15 - \ln 5 = \ln\left(\frac{15}{5}\right) = \ln 3 \longrightarrow \boxed{K=3}$

Muestra 08 P1

a) $\int_1^2 (3x^2-2)\,dx = \left[x^3-2x\right]_1^2 = (8-4)-(1-2) = \boxed{5}$

b) $\int_0^1 2e^{2x}\,dx = \left[e^{2x}\right]_0^1 = e^2 - e^0 = \boxed{e^2-1}$

N13 P1 #4

$\int_1^6 f(x)\,dx = 8$

a) $\int_1^6 2f(x)\,dx = \boxed{16}$

b) $\int_1^6 (f(x)+2)\,dx = \int_1^6 f(x)\,dx + \left[2x\right]_1^6 = 8+12-2 = \boxed{18}$

M14 TZ1 P1 #6

$\int_\pi^a \cos 2x\,dx = \frac{1}{2}$

$\int_\pi^a \cos 2x\,dx = \left[\frac{1}{2}\sin 2x\right]_\pi^a = \frac{1}{2}\sin 2a - \frac{1}{2}\sin 2\pi = \frac{1}{2}\sin(2a)$

$\Rightarrow \sin(2a) = 1 \longrightarrow 2a = \begin{cases} \pi/2 \longrightarrow a = \cancel{\pi/4} \\ \frac{\pi}{2}+2\pi = \frac{5\pi}{2} \\ \vdots \end{cases}$ No vale porque $\frac{\pi}{4} \notin (\pi, 2\pi)$

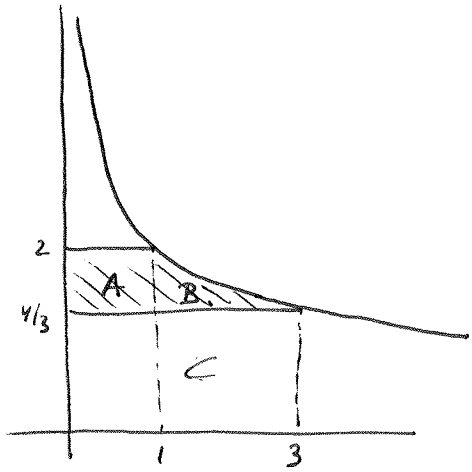
$\boxed{a = \frac{5\pi}{4}}$

Cálculo de Áreas

N00 P2

$$y = 1+\frac{1}{x} \longrightarrow y-1 = \frac{1}{x} \ ; \quad x = \frac{1}{y-1}$$

$$\text{Área} = \int_{4/3}^{2} \frac{1}{y-1}\,dy = \Big[\ln(y-1)\Big]_{4/3}^{2} = \ln 1 - \ln\left(\frac{4}{3}-1\right) = \boxed{-\ln 1/3} = \boxed{\ln 3}$$



También:

$$\text{Área } B+C = \int_1^3 \left(1+\frac{1}{x}\right)dx = (x+\ln x)\Big|_1^3 =$$

$$= 3+\ln 3 - 1 - \ln 1 = 2+\ln 3$$

$$\text{Área } A = 1\cdot\left(2-\frac{4}{3}\right) = \frac{2}{3}$$

$$\text{Área } C = (3-1)\cdot\frac{4}{3} = \frac{8}{3}$$

$$\text{Área sombreada} = \frac{2}{3} + 2+\ln 3 - \frac{8}{3} = \ln 3 \ \checkmark$$

N02 P1

$$\text{Área} = \int_0^{3\pi/4} \operatorname{sen} x\,dx = \Big[-\cos x\Big]_0^{3\pi/4} = -\cos\frac{3\pi}{4} + \cos 0 = \boxed{1-\frac{\sqrt{2}}{2}}$$

N05 P2

$$\text{Área} = \int_0^{K} \operatorname{sen}(2x)\,dx = \Big[-\frac{1}{2}\cos(2x)\Big]_0^{K} = -\frac{1}{2}\cos(2K) + \frac{1}{2}\cos 0 = \frac{1}{2} - \frac{1}{2}\cos(2K)$$

$$\text{Área} = 0'85 \Rightarrow \quad 0'85 = \frac{1}{2}-\frac{1}{2}\cos(2K) \ ; \quad 1'7 = 1-\cos(2K) \ ; \quad \cos(2K) = -0'7$$

$$\cos(2K) = -0'7 \Rightarrow \quad 2K = \begin{cases} 2'346 \longrightarrow \boxed{K = 1'17} \\ 2\pi - 2'346 = 3'9372 \longrightarrow K = \cancel{1'97} \ \text{porque } 1'97 > \pi/2 \end{cases}$$

N07 P1

a]

$$\text{Área} = \int_{3\pi/2}^{2\pi} \cos x\,dx =$$

b]

$$= \Big[\operatorname{sen} x\Big]_{3\pi/2}^{2\pi} = -\operatorname{sen}\frac{3\pi}{2} + \operatorname{sen}\frac{4\pi}{3} + \operatorname{sen} 2\pi - \operatorname{sen}\frac{3\pi}{2} =$$

$$= -(-1) + \frac{1}{2} + 0 - (-1) = \boxed{\frac{5}{2}}$$

c]

$$\text{Área} = -\int_{4\pi/3}^{3\pi/2} \cos x\,dx + \frac{5}{2} = \Big[-\operatorname{sen} x\Big]_{4\pi/3}^{3\pi/2} + \frac{5}{2} = -\operatorname{sen}\frac{3\pi}{2} + \operatorname{sen}\frac{4\pi}{3} + \frac{5}{2} =$$

$$= -(-1) + \frac{1}{2} + \frac{5}{6} = \boxed{4}$$

Muestra 08 P1

$y = \sin 2x$

a) $2x = 2\pi$; $x = \pi$; $\boxed{\text{periodo} = \pi}$

b) $\boxed{m = \pi/2}$

También : $\sin(2x) = 0 \Rightarrow 2x = \begin{cases} 0 \to x = 0 \\ \pi \to x = \pi/2 \\ \vdots \end{cases}$

c) $\text{Área} = \int_0^{\pi/2} \sin(2x)\,dx = \left[-\frac{1}{2}\cos(2x)\right]_0^{\pi/2} = -\frac{1}{2}\cos\pi + \frac{1}{2}\cos 0 = \frac{1}{2} + \frac{1}{2} = \boxed{1}$

M11 TZ2 P1#8

$f(x) = 2x^2 \longrightarrow f'(x) = 4x$

a) $x = 1 \to y = 2$, $y' = 4$ $\quad y - 2 = 4(x-1)$; $y - 2 = 4x - 4$; $y = 4x - 2$ ✓

b) $\left.\begin{array}{l} y = 4x - 2 \\ y = 0 \end{array}\right| \to 4x - 2 = 0$; $\boxed{x = 1/2}$

c) $\text{Area} = \int_0^{1/2} (2x^2)\,dx + \int_{1/2}^{1} (2x^2 - (4x - 2))\,dx =$

$= \left[\frac{2x^3}{3}\right]_0^{1/2} + \left[\frac{2x^3}{3} - 2x^2 + 2x\right]_{1/2}^{1} = \frac{2}{24} + \left(\frac{2}{3} - \cancel{2} + \cancel{2}\right) - \left(\frac{2}{24} - \frac{2}{4} + 1\right) = \boxed{\frac{1}{6}}$

También :

$\text{Area} = \int_0^{1} (2x^2)\,dx - \int_{1/2}^{1} (4x - 2)\,dx = \left[\frac{2x^3}{3}\right]_0^{1} - \left[2x^2 - 2x\right]_{1/2}^{1} =$

$= \frac{2}{3} - (\cancel{2} - \cancel{2}) + \left(\frac{2}{4} - \frac{2}{2}\right) = \frac{1}{6}$ ✓

N11 P1#10

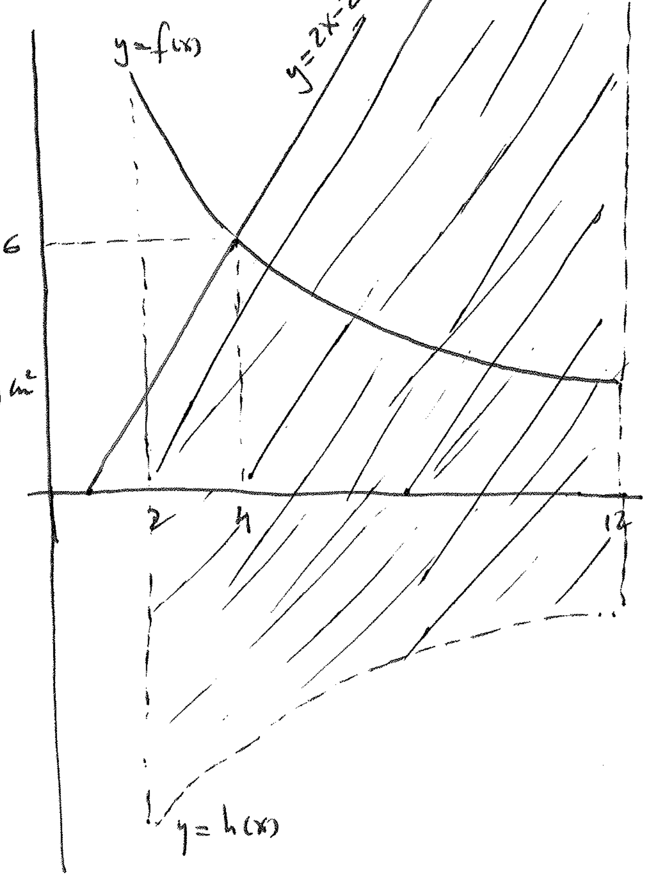
$f(x) = \frac{1}{4}x^2 + 2 \longrightarrow f'(x) = \frac{1}{2}x$

a) $x = 4 \to y = 6$, $y' = 2$

$y - 6 = 2(x - 4)$

$y - 6 = 2x - 8$

$\boxed{y = 2x - 2}$



b) $\text{Area} = \int_2^{12} \frac{90}{3x+4}\,dx = \left[\frac{90}{3}\ln(3x+4)\right]_2^{12} =$

$= 30\ln 40 - 30\ln 10 = 30\ln\frac{40}{10} = \boxed{30\ln 4}\ m^2$

c) $\text{Área} = \boxed{120 + 30\ln 4}\ m^2$

Ya que el área que determina h(x) con el eje X es igual que el determinado por f(x) y el eje X

N12 P1#10

$g(x) = \ln\left(\frac{6x}{x+1}\right)$

b) $g'(x) = \frac{1}{\cancel{\frac{6x}{x+1}}} \cdot \frac{6(x+1) - 6x\cdot 1}{(x+1)^2} = \frac{6x+6-6x}{6x(x+1)} = \frac{6}{6x(x+1)} = \frac{1}{x(x+1)}$ ✓

c) $\int_{1/5}^{k} \frac{1}{x(x+1)}\,dx = \ln 4$; $\left[\ln\left(\frac{6x}{x+1}\right)\right]_{1/5}^{k} = \ln 4$; $\ln\left(\frac{6k}{k+1}\right) - \ln\left(\frac{6/5}{1/5+1}\right) = \ln 4$;

$\ln\frac{6k}{k+1} - \ln 1 = \ln 4$; $\ln\frac{6k}{k+1} = \ln 4$; $\frac{6k}{k+1} = 4$; $6k = 4k+4$; $\boxed{k=2}$

N13 TZ2 P1#7

a) $\int_0^2 f(x)dx$ = Area cuarto círculo radio 2 $= \frac{\pi\cdot 2^2}{4} = \boxed{\pi}$

b) $\int_2^6 f(x)dx = 3\pi - \pi = \boxed{2\pi}$

M14 TZ2 P1#10

$f(x) = \frac{2x}{x^2+5}$

a) $f'(x) = \frac{2(x^2+5) - 2x\cdot 2x}{(x^2+5)^2} = \frac{2x^2+10-4x^2}{(x^2+5)^2} = \frac{10-2x^2}{(x^2+5)^2}$ ✓

b) $\int \frac{2x}{x^2+5}\,dx = \boxed{\ln(x^2+5) + c}$

c) $\int_{\sqrt5}^{q} \frac{2x}{x^2+5}\,dx = \ln 7$; $\left[\ln(x^2+5)\right]_{\sqrt5}^{q} = \ln 7$; $\ln(q^2+5) - \ln 10 = \ln 7$;

$\ln(q^2+5) = \ln 7 + \ln 10$; $\ln(q^2+5) = \ln 70$; $q^2+5 = 70$; $\boxed{q=\sqrt{65}}$

N13 P1#10

$f(x) = \frac{(\ln x)^2}{2}$

a) $f'(x) = \frac{1}{2}\cdot 2\ln x \cdot \frac{1}{x} = \frac{\ln x}{x}$ ✓

b) $f'(x) = 0 \Rightarrow \frac{\ln x}{x} = 0$; $\ln x = 0$; $\boxed{x=1}$

	0		1		$+\infty$
f'		$-$		$+$	
f		↘	MIN	↗	

c) $f'(x) = \frac{\ln x}{x}$

$\left.\begin{array}{l} y = \frac{\ln x}{x} \\ y = 0 \end{array}\right| \rightarrow \frac{\ln x}{x} = 0$; $x = 1$; $\boxed{p=1}$

d) $\left.\begin{array}{l} f'(x) = \frac{\ln x}{x} \\ g(x) = \frac{1}{x} \end{array}\right\}$ $\frac{\ln x}{x} = \frac{1}{x}$; $\ln x = 1$; $x = e$; $\boxed{q=e}$

e) Area $= \int_1^e \left(\frac{1}{x} - \frac{\ln x}{x}\right)dx = \left[\ln x - \frac{(\ln x)^2}{2}\right]_1^e = \ln e - \frac{(\ln e)^2}{2} = 1 - \frac{1}{2} = \frac{1}{2}$ ✓

Cálculo de Volúmenes de Cuerpos de Revolución

M06 P1

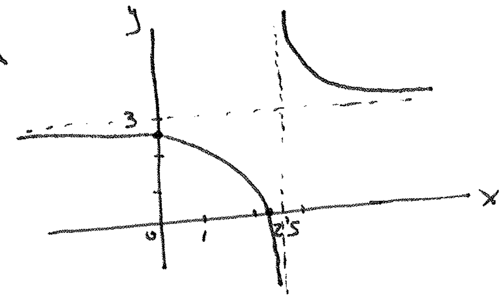
a) $V=\pi\int_0^2 (2x-x^2)^2\,dx =$

b) $=\pi\int_0^2 (4x^2-4x^3+x^4)\,dx = \pi\left[\frac{4x^3}{3}-\frac{\cancel{4}x^4}{\cancel{4}}+\frac{x^5}{5}\right]_0^2 = \pi\left(\frac{32}{3}-16+\frac{32}{5}\right)=\boxed{\frac{16\pi}{15}}$

M07 P2

$f(x)=3+\frac{1}{2x-5}$

a)



b) $x=0 \rightarrow f(0)=3-\frac{1}{5}=2'8$

$y=0 \rightarrow 0=3+\frac{1}{2x-5}$

$-3=\frac{1}{2x-5}\ ;\ -6x+15=1\ ;\ x=2'\overline{3}$

Asíntota Horizontal $y=3$

Asíntota Vertical $x=2'5$

Intersección eje X: $(2'\overline{3},0)$

Intersección eje Y: $(0,2'8)$

c) $\int\left(9+\frac{6}{2x-5}+\frac{1}{(2x-5)^2}\right)dx = \int\left(9+\frac{6}{2x-5}+(2x-5)^{-2}\right)dx =$

$= 9x+3\ln(2x-5)+\frac{1}{2}\frac{(2x-5)^{-1}}{-1} = \boxed{9x+3\ln(2x-5)-\frac{1}{2}\frac{1}{2x-5}+C}$

d) $V=\pi\int_3^a\left(3+\frac{1}{2x-5}\right)^2dx = \pi\int_3^a\left(9+\frac{6}{2x-5}+\frac{1}{(2x-5)^2}\right)dx =$

$=\pi\left[9x+3\ln(2x-5)-\frac{1}{2}\frac{1}{2x-5}\right]_3^a =$

$=\pi\left(9a+3\ln(2a-5)-\frac{1}{2(2a-5)}-27-3\ln 1+\frac{1}{2}\right)=$

$=\pi\left(9a-\frac{1}{4a-10}-26'5+3\ln(2a-5)\right) \rightarrow 2a-5=3 \Rightarrow \boxed{a=4}$

$V=\pi\left(\frac{28}{3}+3\ln 3\right)$

Comprobamos que: $9\cdot 4-\frac{1}{4\cdot 4-10}-26'5=\frac{28}{3}$ ✓

M08 P1

$V=\pi\int_0^{\pi/2}\left[\sqrt{3}\,\text{sen}\,x\,(\cos x)^{1/2}\right]^2dx = \pi\int_0^{\pi/2}3\,\text{sen}^2x\cos x\,dx =$

$=\pi\left[\text{sen}^3x\right]_0^{\pi/2} = \pi\left(\text{sen}^3\frac{\pi}{2}-\text{sen}^3 0\right)=\boxed{\pi}$

M09 P1

$V=\pi\int_0^a(\sqrt{x})^2dx = \pi\int_0^a x\,dx = \pi\left[\frac{x^2}{2}\right]_0^a=\pi\frac{a^2}{2} \rightarrow \frac{\pi a^2}{2}=32\pi\ ;\ a^2=64\ ;\ \boxed{a=8}$

$V=32\pi$

No serviría $a=-8$ por no estar definida $\sqrt{x}$

N09 P1

$f(x) = \sqrt{x} \longrightarrow f'(x) = \frac{1}{2} x^{-1/2} = \frac{1}{2\sqrt{x}}$

a) $x = 4$ → $y = \sqrt{4} = 2$

→ $y' = \frac{1}{2\sqrt{4}} = \frac{1}{4} \longrightarrow$ Pendiente Normal $= -4$

$y - 2 = -4(x-4)$

$y - 2 = -4x + 16$

$\boxed{y = 18 - 4x}$ ✓

b) $\left.\begin{array}{l} y=0 \\ y = 18-4x \end{array}\right\} \quad x = \frac{18}{4} = 4'5 \qquad \boxed{A(4'5, 0)}$

c) $\text{Area} = \int_0^4 \sqrt{x}\, dx + \int_4^{4'5} (18-4x)\, dx$

d) $V = \pi \int_0^4 (\sqrt{x})^2 dx + \pi \int_4^{4'5} (18-4x)^2 dx =$

$= \pi \int_0^4 x\,dx + \pi \int_4^{4'5} (324 - 144x + 16x^2)\, dx =$

$= \pi \left[\frac{x^2}{2}\right]_0^4 + \pi \left[324x - 72x^2 + \frac{16x^5}{5}\right]_4^{4'5} =$

$= \pi \frac{16}{8} + \pi \left(324 \cdot 4'5 - 72 \cdot 4'5^2 + 16 \cdot \frac{4'5^5}{5}\right) - \pi \left(324 \cdot 4 - 72 \cdot 4^2 + 16 \cdot \frac{4^2}{5}\right) =$

$= \boxed{5711'7\pi}$

N10 TZ1 P1#6

$V = \pi \int_{-2}^{2} (\sqrt{16-4x^2})^2 dx = \pi \int_{-2}^{2} (16-4x^2)dx = \pi \left[16x - \frac{4x^3}{3}\right]_{-2}^{2} =$

$= \pi \left[32 - \frac{32}{3}\right] - \pi\left[-32 + \frac{32}{3}\right] = \pi \left[64 - \frac{64}{3}\right] = \boxed{\frac{128\pi}{3}}$

También: $V = 2\pi \int_0^2 (16-4x^2)dx = 2\pi \left[16x - \frac{4x^3}{3}\right]_0^2 = 2\pi\left[32 - \frac{32}{3}\right] = \frac{128\pi}{3}$ ✓

N12 P1#3

a) $\int_4^{10} (x-4)dx = \left[\frac{(x-4)^2}{2}\right]_4^{10} = \frac{6^2}{2} - \frac{0^2}{2} = \boxed{18}$

También: $\int_4^{10} (x-4)dx = \left[\frac{x^2}{2} - 4x\right]_4^{10} = \left(\frac{100}{2} - 40\right) - \left(\frac{16}{2} - 16\right) = 50 - 40 - 8 + 16 = 18$ ✓

b) $V = \pi \int_4^{10} (\sqrt{x-4})^2 dx = \pi \int_4^{10} (x-4)dx = \pi \cdot 18 = \boxed{18\pi}$

M14 TZ1 P1#3

a) $\int_1^2 f(x)dx = \int_1^2 x^4 dx = \left[\frac{x^5}{5}\right]_1^2 = \frac{32}{5} - \frac{1}{5} = \frac{31}{5} = \boxed{6'2}$

b) $V = \pi \int_1^2 (x^2)^2 dx = \pi \cdot 6'2 = \boxed{6'2\pi}$

Cálculo Integral con Calculadora Gráfica

Muestra 06/08 P2 #1

$f(x) = -0'5x^2 + 2x + 2'5$

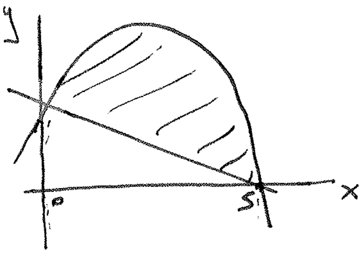
a) $f'(x) = \boxed{-x+2}$

$f'(0) = \boxed{2}$

b) $x=0 \begin{cases} \to f(0) = 2'5 \\ \to f'(0) = 2 \end{cases} \to$ Pendiente Normal $= -\frac{1}{2}$ | $y - 2'5 = -\frac{1}{2}(x-0)$; $y - 2'5 = -0'5x$; $\boxed{y = -0'5x + 2'5}$ ✓

$g(x) = -0'5x + 2'5$

c) $\left.\begin{array}{l} f(x) = -0'5x^2+2x+2'5 \\ g(x) = -0'5x+2'5 \end{array}\right\} \to x = \begin{cases} 0 \\ 5 \end{cases}$ (Hecho con calculadora gráfica.)



d) $\text{Area} = \int_0^5 (-0'5x^2+2x+2'5) - (-0'5x+2'5)\,dx =$

$= \boxed{125/12}$ (Hecho con calculadora.)

M10 TZ1 P2#9

$f(x) = Ae^{kx} + 3$

a) $f(0) = 13 \Rightarrow 13 = Ae^{k\cdot 0} + 3$; $10 = Ae^{k \cdot 0}$; $\boxed{10 = A} \to f(x) = 10e^{kx} + 3$

b) $f(15) = 10e^{15k} + 3$

$3'49 = 10 \cdot e^{15k} + 3$; $0'49 = 10 \cdot e^{15k}$; $0'049 = e^{15k}$; $15k = \ln 0'049$;

$k = \frac{1}{15} \cdot \ln 0'049 = \boxed{-0'201}$

c) $f(x) = 10e^{-0'201x} + 3$

$f'(x) = 10 \cdot e^{-0'201x} \cdot (-0'201) = \boxed{-2'01 \cdot e^{-0'201x}}$

Una exponencial toma siempre valores positivos, por lo que $-2'01 \cdot e^{-0'201x}$ es siempre negativo, por lo que f será una función decreciente para todo x.

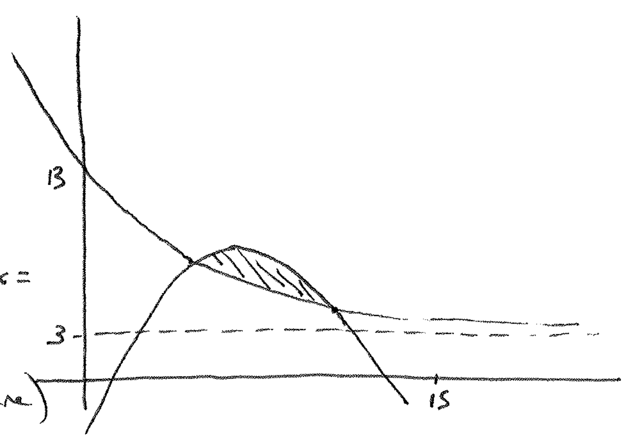
$\lim_{x \to +\infty} 10e^{-0'201x} + 3 = 10 \cdot e^{-\infty} + 3 = 10 \cdot 0 + 3 = 3 \to \boxed{y=3}$ Asíntota Horizontal.

$g(x) = -x^2 + 12x - 24$

d) Los puntos de intersección de $f(x)$ y $g(x)$ son: $x = \begin{cases} 3'8953\ldots \\ 8'6940\ldots \end{cases}$

$\text{Area} = \int_{3'90}^{8'69} (-x^2+12x-24) - (10e^{-0'201x} + 3)\,dx =$

$= \boxed{19'5}$ (Hecho con calculadora)



NOV 10 P2#8

$f(x) = x\ln(4-x^2)$; $x \in (-2,2)$

a) $0 = x\ln(4-x^2) \rightarrow \boxed{x=0}$

$\rightarrow \ln(4-x^2)=0$; $4-x^2=1$; $3=x^2$; $x = \begin{cases} -\sqrt{3} \\ \sqrt{3} \end{cases}$ $\boxed{a=-\sqrt{3}}$ $\boxed{b=\sqrt{3}}$

b) $c = \boxed{1'15}$ (Hecho con la calculadora)

c) $V = \pi \int_0^{1'15} [x\ln(4-x^2)]^2 dx = \boxed{2'16}$ (Hecho con calculadora)

d) $\text{Área} = -\int_{-\sqrt{3}}^{0} x\ln(4-x^2)dx + \int_0^{1'15} x\ln(4-x^2)dx = \boxed{2'07}$ (Hecho con calculadora)

También : $\text{Área} = \int_{-\sqrt{3}}^{1'15} |x\ln(4-x^2)|dx = 2'07$

función ABS

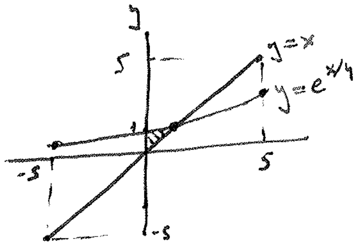
M11 TZ1 P2#6

$\left.\begin{array}{l} f(x) = \ln(x^2) \\ g(x) = e^x \end{array}\right\} \rightarrow x = \begin{cases} 0 \\ -1'11 \end{cases}$ (Hecho con calculadora)

$\text{Área} = \int_{-1'11}^{0} (\ln(x^2) - e^x)dx = \boxed{0'282}$

M13 TZ2 P2#10

a) $f(x) = e^{x/4}$
$g(x) = x$



$\left.\begin{array}{l} f(x) = e^{x/4} \\ g(x) = x \end{array}\right\} \rightarrow x = 1'42961\ldots$

(Hecho con calculadora)

$\text{Área} = \int_0^{1'42961\ldots} (e^{x/4} - x)dx = \boxed{0'697}$

b) $f(x) = e^{x/4}$
$g(x) = mx$

En principio parece que el mayor área sería cuando $f(5) = g(5) \Rightarrow e^{5/4} = m \cdot 5$

$m = \frac{1}{5}e^{5/4}$

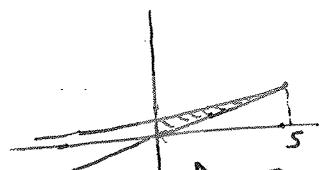


Gráfico falso

Sin embargo resulta que las dos funciones $\left.\begin{array}{l} f(x) = e^{x/4} \\ g(x) = \frac{1}{5}e^{5/4}\cdot x \end{array}\right|$ se cortan en otro punto, concretamente en $x=3'4$, por lo que el área no resulta ser máxima.

El gráfico, en realidad sería algo así:

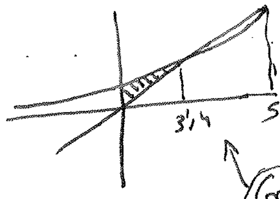
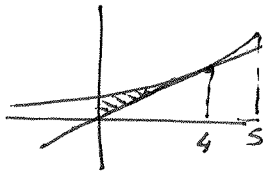


Gráfico real

Por lo tanto, tenemos que buscar el máximo área consiguiendo que la recta $g(x)=mx$ sea tangente a $f(x)=e^{x/4}$ en un cierto punto $x=a$:

$$\left.\begin{array}{l} f(a)=g(a) \Rightarrow e^{a/4}=ma \\ \left.\begin{array}{l} f'(x)=\frac{1}{4}e^{x/4} \\ g'(x)=m \end{array}\right| f'(a)=g'(a) \Rightarrow \frac{1}{4}e^{a/4}=m \end{array}\right\} \Rightarrow \frac{1}{4}\cdot ma = m \; ; \; \boxed{a=4} \Downarrow \boxed{m=\frac{1}{4}e}$$



M12 TZ1 P2#4

$y=(x-1)\sin x$

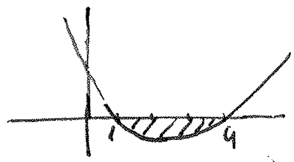
$y=0 \Rightarrow (x-1)\sin x=0$ → $x-1=0$; $x=1$ ✓
→ $\sin x=0$; $x=\begin{cases}0\\ \pi \\ \boxed{2\pi}\end{cases}$ ← $\boxed{k=2\pi}$

$V=\pi\int_{\pi}^{2\pi}(x-1)^2\sin^2 x\,dx = \boxed{69'6}$ (Hecho con calculadora)

N13 P2#2

$f(x)=(x-1)(x-4)$

$y=0 \Rightarrow (x-1)(x-4)=0$; $\boxed{x=\begin{cases}1\\4\end{cases}}$



$V=\pi\int_1^4 (x-1)^2(x-4)^2\,dx = \boxed{81\pi}=\boxed{25'4}$ (Hecho con calculadora)

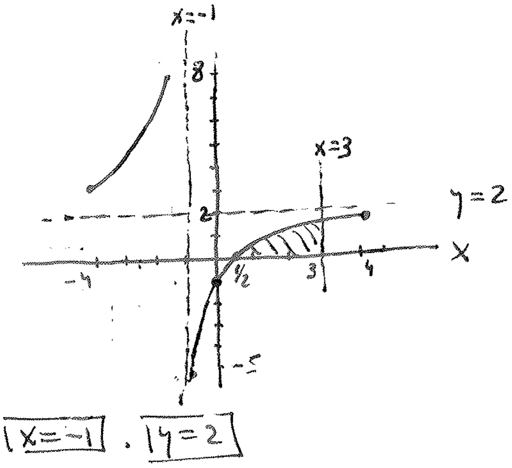
Muestra 14 P2#9

$h(x)=\dfrac{2x-1}{x+1}$ $(x\neq -1)$

a) $x=\dfrac{2y-1}{y+1}$; $xy+x=2y-1$; $xy-2y=-x-1$; $y(x-2)=-x-1$; $y=\dfrac{-x-1}{x-2}$

$\boxed{h^{-1}(x)=\dfrac{x+1}{2-x}}$

b)



Asíntotas: $\boxed{x=-1}$, $\boxed{y=2}$

Intersección eje X: $\boxed{(\frac{1}{2},0)}$

c) Área $=\int_{1/2}^{3}\dfrac{2x-1}{x+1}\,dx = \boxed{2'06}$ (Hecho con calculadora)

$$\boxed{V=\pi\int_{1/2}^{3}\left(\frac{2x-1}{x+1}\right)^2 dx}$$

Problemas conjuntos de Cálculo Diferencial e Integral

NO1 P2

a) $f(x) = -x(x-a)(x-b)$

Corta al eje X en: $\begin{matrix}-3 \\ 0 \\ 5\end{matrix}$ $\boxed{\begin{matrix}a=-3 \\ b=5\end{matrix}}$ $\Rightarrow$ $\boxed{f(x) = -x(x+3)(x-5)}$

b) $f(x) = -x(x+3)(x-5) = -x^3+2x^2+15x$

$f'(x) = -3x^2+4x+15$

$f'(x)=0 \Rightarrow 3x^2-4x-15=0 \; ; \; x = \frac{4\pm\sqrt{16+180}}{6} = \frac{4\pm 14}{6} \begin{matrix} \nearrow 3 \\ \searrow -5/3 \end{matrix}$

$Q(3, f(3)) \qquad f(3) = -3(3+3)(3-5) = \boxed{36}$

c) $x=0 \begin{matrix} \rightarrow f(0)=0 \\ \rightarrow f'(0)=15 \end{matrix} \qquad y-0 = 15(x-0) \; ; \; \boxed{y=15x}$

$\left.\begin{matrix} y = -x^3+2x^2+15x \\ y=15x \end{matrix}\right\} \quad \cancel{15x} = -x^3+2x^2+\cancel{15x} \; ; \; x^3-2x^2=0 \; ; \; x^2(x-2)=0 \; ; \; x = \begin{matrix} \nearrow 0 \\ \searrow \boxed{2} \end{matrix}$

d) $\text{Área} = \int_0^5 (-x^3+2x^2+15x)\,dx = \left[-\frac{x^4}{4} + \frac{2x^3}{3} + \frac{15x^2}{2}\right]_0^5 = -\frac{625}{4} + \frac{250}{3} + \frac{375}{2} = \boxed{114'58\widehat{3}}$

MO5 P2

$f(x) = \frac{1}{2}\sin 2x + \cos x \qquad (0 \le x \le 2\pi)$

a) $f'(x) = \frac{1}{2}\cdot\cos 2x \cdot 2 - \sin x = \boxed{\cos 2x - \sin x} = \cos^2 x - \sin^2 x - \sin x = 1-\sin^2 x - \sin^2 x - \sin x =$

$= -2\sin^2 x - \sin x + 1$

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

$\sin x = \frac{-1\pm\sqrt{1+8}}{4} = \frac{-1\pm 3}{4} \begin{matrix} \nearrow 1/2 \\ \searrow -1 \end{matrix} \longrightarrow 2\sin^2 x + \sin x - 1 = 2\left(\sin x - \frac{1}{2}\right)(\sin x + 1)$

$f'(x)=0 \Rightarrow \sin x = \begin{matrix} \nearrow 1/2 \Rightarrow x = \begin{matrix} \nearrow 30^\circ \equiv \pi/6 \text{ rad} \\ \searrow 150^\circ = 5\pi/6 \text{ rad} \end{matrix} \\ \searrow -1 \Rightarrow x = 270^\circ = 3\pi/2 \text{ rad} \end{matrix}$

	0 – $\pi/6$	$\pi/6$ – $5\pi/6$	$5\pi/6$ – $3\pi/2$	$3\pi/2$ – 2π
f'	+	−	+	+
f	↗	↘	↗	↗

b) Máximo Relativo en A: $\boxed{x=\pi/6}$

c) $f(x)=0 \rightarrow \frac{1}{2}\sin 2x + \cos x = 0$

$\frac{1}{2}\cdot 2\sin x\cos x + \cos x = 0 \rightarrow \cos x(\sin x + 1) = 0 \begin{matrix} \rightarrow \cos x = 0 \Rightarrow x = \begin{matrix} \nearrow 90^\circ = \frac{\pi}{2} \\ \searrow \end{matrix} \\ \rightarrow \sin x = -1 \longrightarrow 270^\circ = \frac{3\pi}{2} \end{matrix}$

$\text{Área} = \int_{\pi/6}^{\pi/2}\left(\frac{1}{2}\sin 2x + \cos x\right)dx - \int_{\pi/6}^{\pi/2}\left(\frac{1}{2}\sin 2x + \cos x\right)dx =$

$= \left[-\frac{1}{4}\cos(2x) + \sin x\right]_{\pi/6}^{\pi/2} - \left[-\frac{1}{4}\cos(2x) + \sin x\right]_{\pi/2}^{5\pi/6} =$

$= \left(-\frac{1}{4}\cos\pi + \sin\frac{\pi}{2}\right) - \left(-\frac{1}{4}\cos\frac{\pi}{3} + \sin\frac{\pi}{6}\right) - \left(-\frac{1}{4}\cos\frac{5\pi}{3} + \sin\frac{5\pi}{6}\right) + \left(-\frac{1}{4}\cos\pi + \sin\frac{\pi}{2}\right) =$

$= -\frac{1}{4}\cdot(-1) + 1 + \frac{1}{4}\cdot\frac{1}{2} - \frac{1}{2} + \frac{1}{4}\cdot\frac{1}{2} - \frac{1}{2} - \frac{1}{4}\cdot(-1) + 1 = \boxed{\frac{7}{4}}$

M09
P1

$$f(x) = \frac{ax}{x^2+1}$$

a) $f(-x) = \frac{a(-x)}{(-x)^2+1} = \frac{-ax}{x^2+1} = -f(x)$ ✓

b) $f''(x)=0 \Rightarrow \frac{2ax(x^2-3)}{(x^2+1)^3} = 0 \Rightarrow 2ax(x^2-3)=0 \Rightarrow x = 0,\ \sqrt{3},\ -\sqrt{3}$ $\boxed{\begin{array}{l}(0,0)\\ (\sqrt{3},\ a\sqrt{3}/4)\\ (-\sqrt{3},\ -a\sqrt{3}/4)\end{array}}$ Puntos Inflexión

c) $\text{Area} = \int_3^7 f(x)\,dx = \left[\frac{a}{2}\ln(x^2+1)\right]_3^7 = \frac{a}{2}\ln 50 - \frac{a}{2}\ln 10 = \frac{a}{2}\ln\left(\frac{50}{10}\right) = \boxed{\frac{a}{2}\ln 5}$

$$\int_4^8 2f(x-1)\,dx = \int_3^7 2f(x)\,dx = 2\frac{a}{2}\ln 5 = \boxed{a\sqrt{5}}$$

N10
P1 #10

a) $\vec{QP} = (a-\frac{2}{3},\ f(a)-0) = (a-\frac{2}{3},\ a^3) \longrightarrow \text{pendiente} = \frac{a^3}{a-\frac{2}{3}}$ ✓

$f(x) = x^3 \longrightarrow f'(x) = 3x^2$; $\boxed{f'(a) = 3a^2}$

$3a^2 = \frac{a^3}{a-\frac{2}{3}} \Rightarrow 3a^3 - 2a^2 = a^3$; $2a^3 - 2a^2 = 0$; $2a^2(a-1)=0 \Rightarrow a = \begin{cases} 0 \\ \boxed{1} \end{cases}$ ✓

b) $x=1 \begin{cases} \longrightarrow f(1) = 1^3 = 1 \\ \longrightarrow f'(1) = 3\cdot 1^2 = 3 \end{cases} \Rightarrow y-1 = 3(x-1)$; $y-1 = 3x-3$; $y = 3x-2$ ✓
Recta Tangente

$$\text{Area} = \int_{-2}^{K} x^3 - (3x-2)\,dx = \left[\frac{x^4}{4} - \frac{3x^2}{2} + 2x\right]_{-2}^{K} =$$

$$= \left(\frac{K^4}{4} - \frac{3K^2}{2} + 2K\right) - \left(\frac{16}{4} - \frac{12}{2} - 4\right) = \frac{K^4}{4} - \frac{3K^2}{2} + 2K + 6$$

$\text{Area} = 2K+4 \Rightarrow \frac{K^4}{4} - \frac{3K^2}{2} + 2K + 6 = 2K + 4$; $\frac{K^4}{4} - \frac{3K^2}{2} + 2 = 0$;

$$\boxed{K^4 - 6K^2 + 8 = 0}$$

Problemas de cinemática

N01 P2

$v = 50 - 50\, e^{-0'2t}$

a) $t=0 \Rightarrow v = 50 - 50\cdot e^{0} = \boxed{0\ m/sg}$

$t=10 \Rightarrow v = 50-50\, e^{-2} = \boxed{43{,}2\ m/sg}$

b) $a = \dfrac{dv}{dt} = -50\cdot(-0'2)\, e^{-0'2t} = \boxed{10\, e^{-0'2t}}$

$t=0 \Rightarrow a = 10\cdot e^{0} = \boxed{10\ m/sg^2}$

c) $\lim\limits_{t\to+\infty} v = \lim\limits_{t\to+\infty}(50-50e^{-0'2t}) = 50-50\cdot e^{-\infty} = 50-50\cdot 0 = \boxed{50\ m/sg}$

$\lim\limits_{t\to+\infty} a = \lim\limits_{t\to+\infty} 10e^{-0'2t} = 10\cdot e^{-\infty} = 10\cdot 0 = \boxed{0\ m/sg^2}$

Con el paso del tiempo, la velocidad aumenta debido a que dispone de aceleración, pero como ésta se hace cada vez menor, el crecimiento de la velocidad es cada vez menor estabilizándose en $t\to+\infty$ en $50\ m/sg$.

d) $y = \int v\,dt = \int (50-50e^{-0'2t})\,dt = 50t - 50\dfrac{1}{-0'2}e^{-0'2t} + K = \boxed{50t+250e^{-0'2t}+K}$ ✓

$\left.\begin{matrix} t=0 \\ y=0 \end{matrix}\right| \Rightarrow 0 = 50\cdot 0 + 250\cdot e^{0} + K \ ; \ 0 = 250+K \Rightarrow \boxed{K=-250}$

$y = 250\ m \rightarrow 250 = 50t + 250e^{-0'2t} - 250 \ ; \ 500 = 50t + 250e^{-0'2t} \ ; \ 10 = t + 5e^{-0'2t}$

$\boxed{t = 9'2070\ sg}$

N02 P2

a) $v = \dfrac{ds}{dt} = 30 - at \rightarrow s = \int (30-at) = 30t - \dfrac{at^2}{2} + K$

$\left.\begin{matrix} t=0 \\ s=0 \end{matrix}\right| \rightarrow 0 = 30\cdot 0 - \dfrac{a\cdot 0^2}{2} + K \Rightarrow K=0 \quad \boxed{s = 30t - \dfrac{at^2}{2}}$

b) $v = 30 - 5t \longrightarrow s = 30t - \dfrac{5t^2}{2}$

$t=0 \Rightarrow \boxed{v = 30\ m/sg}$

$v=0 \Rightarrow 0 = 30-5t \ ; \ t=6 \rightarrow s = 30\cdot 6 - \dfrac{5\cdot 6^2}{2} = 90\ m \quad \boxed{90\ m < 200\ m}$ ✓

c) $v = 30 - at \longrightarrow s = 30t - \dfrac{at^2}{2}$

$v=0 \Rightarrow 0 = 30 - at \Rightarrow \boxed{t = \dfrac{30}{a}}$

$\left.\begin{matrix} t=30/a \\ s=200 \end{matrix}\right| \rightarrow 200 = 30\cdot\dfrac{30}{a} - \dfrac{a(30/a)^2}{2} \ ; \ 200 = \dfrac{900}{a} - \dfrac{900}{2a} \ ; \ 200a = 900-450 \Rightarrow \boxed{a = 2'25\ m/sg^2}$

M04 P1

$v = 4t + 5 - 5e^{-t}$

a) b) $d = \int_0^4 (4t+5-5e^{-t})\,dt = \left[2t^2+5t+5e^{-t}\right]_0^4 = \boxed{47{,}1\ m}$

M06 P1#12

$v = 4t^3 - 2t$

$s = \int v\,dt = \int (4t^3-2t)\,dt = t^4 - t^2 + K$

$\left.\begin{matrix} t=2 \\ s=8 \end{matrix}\right| \Rightarrow 8 = 2^4 - 2^2 + K \rightarrow K=-4 \quad \boxed{s(t) = t^4 - t^2 - 4}$

Muestra 06/08 P1 #7

$v = 50 - 10t$

a) $a = \frac{dv}{dt} = \boxed{-10\ m/sg^2}$

b) $s = \int (50 - 10t)\,dt = 50t - 5t^2 + K$

$\left.\begin{matrix} t=0 \\ s=40 \end{matrix}\right| \rightarrow 40 = 50 \cdot 0 - 5 \cdot 0^2 + K \ ; \ K = 40 \qquad \boxed{s = 50t - 5t^2 + 40}$

M07 P1 #9

$v = e^{3t-2}$

a) $a = \frac{dv}{dt} = 3e^{3t-2}$

$t = 1 \rightarrow a = 3e = \boxed{8'15\ m/sg^2}$

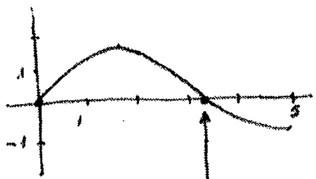
b) $v = 22'3\ m/sg \Rightarrow 22'3 = e^{3t-2} \ ; \ 3t - 2 = \ln 22'3 \ ; \ t = \frac{2 + \ln 22'3}{3} = \boxed{1'70\ sg}$

c) $s = \int_0^1 e^{3t-2}\,dt = \left[\frac{1}{3} e^{3t-2}\right]_0^1 = \frac{1}{3} e - \frac{1}{3} e^{-2} = \boxed{0'861\ m}$

M13 TZ1 P2 #5

$v = e^{\sin t} - 1 \quad (0 \le t \le 5)$

a)



← Hecho con calculadora

b) $v = 0 \Rightarrow t = 3'14$ ← Hecho con calculadora

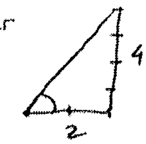
$d = \int_0^5 |e^{\sin t} - 1|\,dt = \boxed{3'95\ m}$ También $\int_0^{3'14} (e^{\sin t} - 1)\,dt - \int_{3'14}^{5} (e^{\sin t} - 1)\,dt$

Muestra 14 P1 #3

a) $v(3) = 4\ m\,s^{-1}$

b) $a(1'5) = \frac{4}{2} = 2\ m\,s^{-2}$

Ya que la pendiente de la recta se puede calcular como cateto opuesto dividido entre cateto contiguo:



c) $d = \int_0^6 v\,dt = \text{Area Trapecio} = \frac{B+b}{2} \cdot h = \frac{6+3}{2} \cdot 4 = \boxed{18\ m}$

También:

$$v = \begin{cases} 2t & \text{si } 0 \le t \le 2 \\ 4 & \text{si } 2 < t < 5 \\ 24 - 4t & \text{si } 5 \le t \le 6 \end{cases}$$

$$d = \int_0^6 dt = \int_0^2 2t\,dt + \int_2^5 4\,dt + \int_5^6 (24 - 4t)\,dt = \left[t^2\right]_0^2 + \left[4t\right]_2^5 + \left[24t - 2t^2\right]_5^6 =$$

$$= 4 + 20 - 8 + (144 - 72) - (120 - 50) = 18m \ ✓$$

Mayo 14
TZ1
P2 #6

$V_R = 40 - t^2$

$S_L = 2t^2 + 60$

$t = 0 \rightarrow S_L(0) = 60 = S_R(0)$

$S_R = \int (40 - t^2)\,dt = 40t - \frac{t^3}{3} + C$

$S_R(0) = 60 \Rightarrow C = 60$

$\Rightarrow S_R = 40t - \frac{t^3}{3} + 60$

$t = 10 \Rightarrow S_R(10) = 400 - \frac{1000}{3} + 60 = \boxed{\frac{380}{3}\text{ m}}$