M07 P2

$f(x) = e^x \operatorname{sen} x$

a) $\boxed{C(\pi, 0)}$

b) $f'(x) = e^x \operatorname{sen} x + e^x \cos x = e^x(\operatorname{sen} x + \cos x)$

$\boxed{f'(x) = 0}$ en el punto B

c) $f''(x) = e^x \cancel{\operatorname{sen} x} + e^x \cos x + e^x \cos x - e^x \cancel{\operatorname{sen} x} = \boxed{2e^x \cos x}$ ✓

d) $\boxed{f''(x) = 0}$ en el punto de inflexión A.

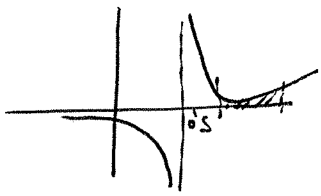
$2e^x \cos x = 0 \Rightarrow x = \pi/2 \rightarrow \boxed{A(\pi/2, e^{\pi/2})}$

e) Area $= \int_0^{\pi} e^x \operatorname{sen} x \, dx = \boxed{12'0703}$

NOV07 P2

$f(x) = e^{2x-1} + \frac{5}{2x-1} \quad (x \neq 1/2)$

a)



Asíntota Horizontal $y=0$ cuando $x \to -\infty$

" Vertical $x = 1/2$

b) $\int_0^2 f(x)\,dx$ no representa un área entre la curva y el eje X porque f(x) toma valores negativos y positivos en el intervalo de integración (aparte del problema de la asíntota vertical).

c) $V = \pi \int_1^{1'5} f^2(x)\,dx = \boxed{104'7654}$

d) $f'(x) = e^{2x-1} \cdot 2 + \frac{-5 \cdot 2}{(2x-1)^2} = \boxed{2e^{2x-1} - \frac{10}{(2x-1)^2}}$

e) Mínimo en $(1'1084, 7'4855)$

$f(x) = K$ sin solución $\Big| \longrightarrow K \in [0, 1'1084)$ $\quad \boxed{p=0} \quad \boxed{q = 1'1084}$

M08 P2

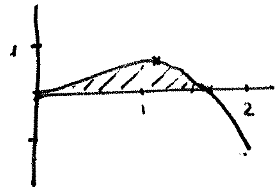
a) $f(x) = g(x) \longrightarrow x = \begin{cases} 3'7667 \\ 8'3009 \end{cases}$

$A = \int_{3'7667}^{8'3009} (g(x) - f(x))\,dx = \boxed{6'4590}$

b) $f'(x) = \frac{1}{3x-2} \cdot 3 = \boxed{\frac{3}{3x-2}}$; $g'(x) = +4 \cdot \operatorname{sen}(0'5x) \cdot 0'5 = \boxed{2\operatorname{sen}(0'5x)}$

c) $\frac{3}{3x-2} = 2\operatorname{sen}(0'5x) \Rightarrow \boxed{x = \begin{cases} 1'4295 \\ 6'0988 \end{cases}}$

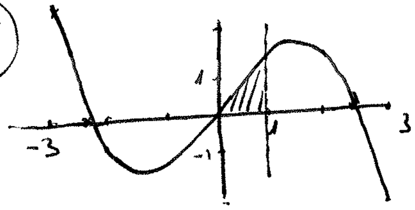
M00 P2



MAX $(1'0769, 0'5498)$
$(0,0)$
$(1'5708,0)$
$(2,-1'6646)$

$$\text{Area} = \int_0^{1'5708} x^2 \cos x \, dx = \boxed{0'4674}$$

M00 P2



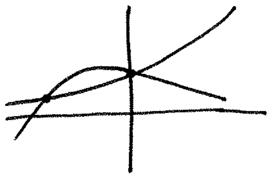
MAX $(1'2469, 1'7313)$
MIN $(-1'2469, -1'7313)$
$(-2'3137, 0)$
$(0,0)$
$(2'3137, 0)$
$(-3, 2'5567)$
$(3, -2'5567)$

$$\left.\begin{array}{l}\pi \operatorname{sen} x - x = 0 \\ x \geq 0\end{array}\right\} \Rightarrow \boxed{x = 2'3137}$$

$$\int (\pi \operatorname{sen} x - x)\,dx = \boxed{-\pi \cos x - \frac{x^2}{2} + K}$$

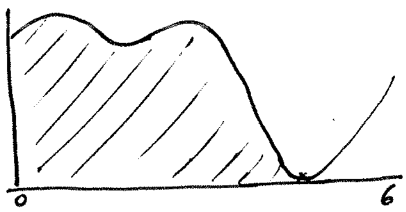
$$\text{Area} = \int_0^1 (\pi \operatorname{sen} x - x)\,dx = \left[-\pi \cos x - \frac{x^2}{2}\right]_0^1 = \left(-\pi \cos 1 - \frac{1}{2}\right) - (-\pi \cos 0 - 0) = \boxed{\pi - \pi \cos 1 - \frac{1}{2}} = \boxed{0'9442}$$

M01 P1



$$e^x = \cos x \Rightarrow \boxed{x = \begin{cases} 1'2927 \\ 0 \end{cases}}$$

M01 P2



MAX $(0'6075, 1)$
MAX $(2'5341, 1)$
MIN $(1'5708, 0'9093)$
MIN $(4'71239, 0)$

$$\text{Area} = \int_0^{4'71239} \operatorname{sen}(1 + \operatorname{sen} x)\,dx = \boxed{3'5169}$$

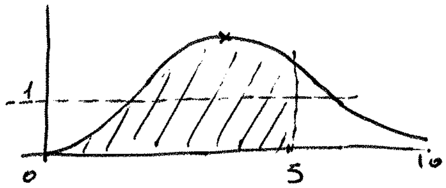
$f(x) = \operatorname{sen}(1 + \operatorname{sen} x)$

$-1 \leq \operatorname{sen} x \leq 1 \Rightarrow 0 \leq 1 + \operatorname{sen} x \leq 2$, como $1 + \operatorname{sen} x \in [0, \pi]$, su seno es positivo.

$$\boxed{\operatorname{sen}(1 + \operatorname{sen} x) \geq 0}$$

NOV 01
P2

$f(x) = x^3 e^{-x}$



(0,0)

MAX(3, 1'3443)

Asíntota Horizontal $y=0$

$$\int_0^5 x^3 e^{-x}\,dx = \boxed{4'4098}$$

$$y=1 \Rightarrow \boxed{x = \begin{cases} 1'8572 \\ 4'5364 \end{cases}}$$

N02
P2

a) $x=0 \rightarrow y = \text{sen}(e^0) = \text{sen}\,1 = \boxed{0'8415}$

b) $y=0 \rightarrow \text{sen}(e^x)=0 \Rightarrow e^x = \begin{cases} 0 & \rightarrow e^x = 0 \;* \\ \pi & \rightarrow e^x = \pi \Rightarrow x = \ln \pi \end{cases}$ $\boxed{K=\pi}$

c) B(~~//~~, 1)

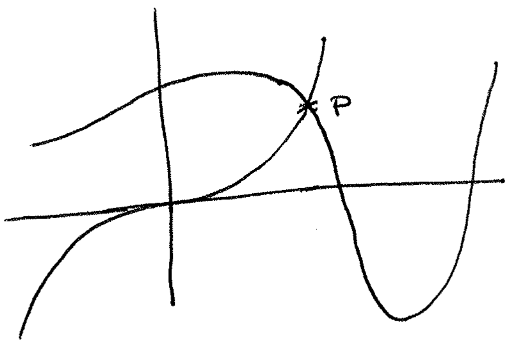
$$\frac{dy}{dx} = \cos(e^x)\cdot e^x$$

$$\frac{dy}{dx} = 0 \Rightarrow \cos(e^x)\cdot e^x = 0 \begin{cases} \cos(e^x)=0 \rightarrow e^x = \begin{cases} \pi/2 \rightarrow \boxed{x = \ln(\pi/2)} \\ 3\pi/2 \end{cases} \\ e^x = 0 \;* \end{cases}$$

✓

d) $$\text{Area} = \int_0^{\ln \pi} \text{sen}(e^x)\,dx = \boxed{0'9059}$$

e) $\boxed{P(0'8766, 0'6735)}$

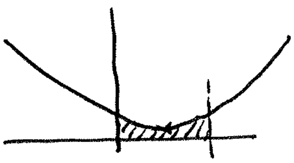


N04
P2

$f'(x) = e^x + x - 5 \Rightarrow f(x) = \int (e^x + x - 5)\,dx = e^x + \frac{x^2}{2} - 5x + K$

$(1, e-2) \in f(x) \Rightarrow \cancel{e}-2 = \cancel{e} + \frac{1}{2} - 5 + K$; $K = 2'5$ $\boxed{f(x) = e^x + \frac{1}{2}x^2 - 5x + 2'5}$ ✓

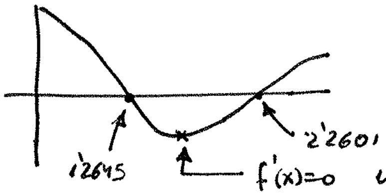
b)



c) $\boxed{\text{MIN}(1'3066, 0'5142)}$

d) $\boxed{\text{Area} = 2'7224}$

NOV04
P1



$f'(x)=0$ en $x = 1'7354$

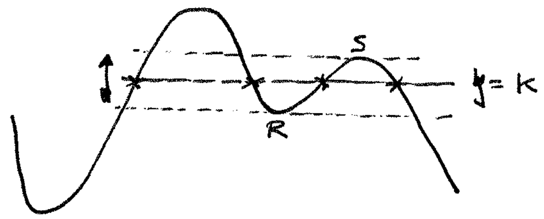
$f(x)=0 \Rightarrow \boxed{x = \begin{cases} 1'2645 \\ 2'2601 \end{cases}}$

NOV04
P2

$a = -2'1416$
$b = 4'1416$

$$Area = \int_{-2'1416}^{1} h(x)\,dx - \int_{1}^{2} h(x)\,dx =$$

c) $S(3'2468,\ 0'9726)$
$R(1'4797,\ -0'2401)$

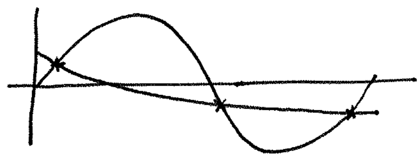


$\boxed{k \in (-0'2401,\ 0'9726)}$

N05
P1

a) $\boxed{b=6}$

b)



$\left.\begin{array}{l} f(x) = g(x) \\ 0'5 \le x \le 1'5 \end{array}\right| \Rightarrow \boxed{x = 1'0477}$

N07
P2

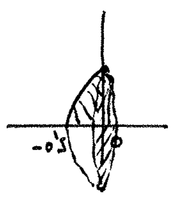
$f(x) = p - \dfrac{3x}{x^2-q^2}$

a) $\boxed{p=2}$ porque la asíntota horizontal es $y=2$

$\boxed{q=1}$ " las asíntotas verticales son $x=\pm 1$

$\boxed{f(x) = 2 - \dfrac{3x}{x^2-1}}$

b) $\boxed{P(-0'5,0)}$



$V = \pi \displaystyle\int_{-0'5}^{0} f^2(x) = \boxed{2'5197}$

c) $f'(x) = -\dfrac{3(x^2-1) - 3x\cdot 2x}{(x^2-1)^2} = \dfrac{3+3x^2}{(x^2-1)^2} = \dfrac{3(x^2+1)}{(x^2-1)^2}$ ✓

Vemos que $f'(x)>0$ para todo x.

No se anula $f'(x)$ porque: $\dfrac{3+3x^2}{(x^2-1)^2} = 0$; $3+3x^2=0$; $3x^2=-3$; $x^2=-1$ ✗

Por lo tanto $f(x)$ no tiene ni máximos ni mínimos.

d) $Area = \displaystyle\int_0^a f'(x)\,dx = f(a) - f(0) = \cancel{2} - \dfrac{3a}{a^2-1} - \cancel{2} = \dfrac{-3a}{a^2-1}$

$Area = 2 \Rightarrow \dfrac{-3a}{a^2-1} = 2$; $-3a = 2a^2-2$; $0 = 2a^2+3a-2$ $\quad a = \begin{cases} \boxed{2} \\ -0'5 \end{cases}$

Muestra 06 P2

a) $d = (10x+2) - (1+e^{2x}) = \boxed{10x+1-e^{2x}}$

$d_{MAX} = 4'0472$ en $\boxed{x = 0'8047}$

b) $y = 1+e^{2x}$

$x = 1+e^{2y}$; $x-1 = e^{2y}$; $2y = \ln(x-1)$; $\boxed{y = \frac{1}{2}\ln(x-1)} = \boxed{\ln\sqrt{x-1}}$

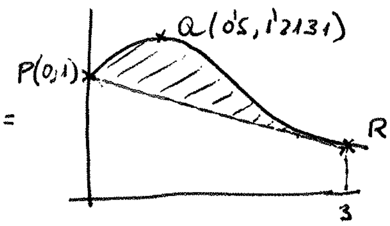
$f^{-1}(x) = \ln\sqrt{x-1}$

$x = 5 \rightarrow f^{-1}(5) = \ln\sqrt{5-1} = \ln\sqrt{4} = \ln 2 \rightarrow \boxed{a = \ln 2}$

c) $V = \pi \int_0^{\ln 2} (1+e^{2x})^2\, dx = \boxed{23'3833}$

Nov 06 P2

a) $f(x) = (2x+1)e^{-x}$



b) $f'(x) = 2e^{-x} + (2x+1)e^{-x}\cdot(-1) =$

$= (2-2x-1)e^{-x} =$

$= \boxed{(1-2x)e^{-x}}$ ✓

$f'(x) = 0 \Rightarrow (1-2x)e^{-x} = 0$ → $\boxed{x = 1/2} \rightarrow y = (2\cdot\frac{1}{2}+1)e^{-1/2} = \boxed{\frac{2}{\sqrt{e}}}$; → $e^{-x} = 0$ ✱

c) $f(x) = k$ dos soluciones $\Rightarrow \boxed{k \in [1, \frac{2}{\sqrt{e}})}$

d) $f''(x) = e^{-x}(-3+2x)$

$f''(x) = 0 \Rightarrow$ → $e^{-x} = 0$ ✱ ; → $-3+2x = 0$; $\boxed{x = 1'5}$ Único punto de inflexión.

e) $x = 3 \rightarrow y = (2\cdot 3+1)e^{-3} = \frac{7}{e^3}$

$P(0,1)$
$R(3, 7/e^3)$

$\overrightarrow{PR} = (3, \frac{7}{e^3}-1) \rightarrow m = \frac{\frac{7}{e^3}-1}{3} = \frac{7-e^3}{3e^3}$

$\overline{PR}: \; y - 1 = \frac{7-e^3}{3e^3}(x-0) \rightarrow \boxed{y = 1 + \frac{7-e^3}{3e^3}x}$

$\text{Área} = \int_0^3 \left|(2x+1)e^{-x} - \left(1 + \frac{7-e^3}{3e^3}\right)\right| dx = \boxed{0'2034}$

M08 P2

$f(x) = e^x(1-x^2)$

a) $f'(x) = e^x \cdot (1-x^2) + e^x \cdot (-2x) = \boxed{e^x(1-2x-x^2)}$ ✓

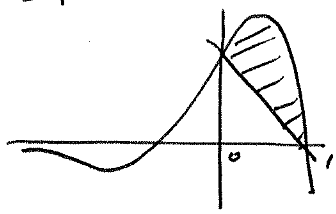
b) Asíntota Horizontal $\boxed{y=0}$

c) $\boxed{r = -2'4142}$ $\boxed{s = 0'4142}$

d) $x=0 \longrightarrow y=1$
$\longrightarrow y' = e^0(1-0-0) = 1 \longrightarrow -\frac{1}{1} = -1$

$y-1 = -1(x-0)$; $\boxed{y = 1-x}$ ✓

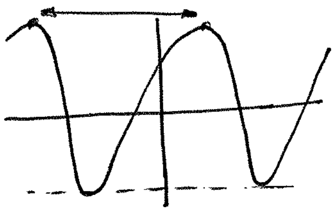
e) $\left.\begin{array}{l} f(x) = e^x(1-x^2) \\ y = 1-x \end{array}\right\} \Longrightarrow x = \begin{array}{l} \nearrow 0 \\ \searrow 1 \end{array}$



$\text{Area} = \int_0^1 \left(e^x(1-x^2) - (1-x)\right) dx = \boxed{0'5}$

M09 P2

$f(x) = 3\,\text{sen}\,x + 4\cos x$ $x \in [-2\pi, 2\pi]$



Busco dos máximos : $(-5'6397, 5)$
$(0'6435, 5)$

El $\boxed{\text{periodo}}$ será : $0'6435 - (-5'6397) = \boxed{6'2832} = \boxed{2\pi}$

Busco los mínimos , que están a la altura -5.

Por lo tanto : $\boxed{\text{Amplitud} = 5}$

$\left.\begin{array}{l} f(x) = 0 \\ x \in (-\pi/2, 0) \end{array}\right| \longrightarrow \boxed{x = -0'9273}$

c) $\boxed{f(x) = 5\,\text{sen}\,(x + 0'9273)}$

d) $\boxed{x = 0'6435}$ También : $f'(x) = 5\cos(x + 0'9273)$

$x + 0'9273 = \frac{\pi}{2} \longrightarrow x = \frac{\pi}{2} - 0'9273 = \boxed{0'6435}$

e) $\left.\begin{array}{l} f(x) = K \\ \text{Dos soluciones} \end{array}\right| \longrightarrow$ Únicamente en los dos máximos y mínimos :

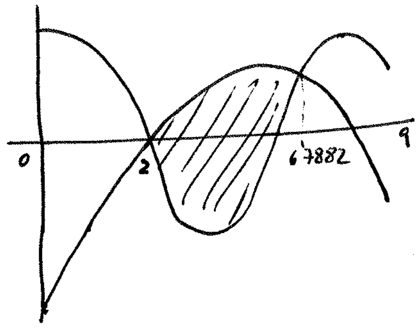
$\boxed{\begin{array}{l} K = 5 \\ K = -5 \end{array}}$

f) $\left.\begin{array}{l} f'(x) = g'(x) \\ x \in [0,1] \end{array}\right| \longrightarrow \boxed{x = 0'5107}$

N09
P2

$f(x) = 5 \cos \frac{\pi x}{4}$

$g(x) = -0'5x^2 + 5x - 8$ $\quad x \in [0, 9]$



b) $\boxed{\text{Amplitud} = 5}$

$\frac{\pi x}{4} = 2\pi \Rightarrow x = 8$

$\boxed{\text{Periodo} = 8}$

$\left.\begin{array}{l} f(x) = 0 \\ x \in [0, 3] \end{array}\right| \Rightarrow \boxed{x = 2}$

c) $g(x) = 0 \Rightarrow \boxed{x = \begin{array}{l} 2 \\ 8 \end{array}}$

Eje simetría $\boxed{x = 5}$

d) $f(x) = g(x) \Rightarrow x = 6'7882$

$$\text{Area} = \int_2^{6'7882} (g(x) - f(x))\, dx = \boxed{27'6449}$$