TRIMESTRE 1: PRUEBA 1

EJERCICIO 1

a) $$\int \frac{4x^3-5x^2-5x}{x+3}\,dx =$$

• EN PRIMER LUGAR, REALIZO LA DIVISIÓN DE POLINOMIOS:

$$\begin{array}{r|rrrr} & 4 & -5 & -5 & 0 \\ -3 & & -12 & 51 & -138 \\ \hline & 4 & -17 & 46 & \boxed{-138} \end{array}$$

$-138 \longrightarrow$ RESTO

$4x^2-17x+46 \longrightarrow$ COCIENTE

$$\int \left(4x^2-17x+46-\frac{138}{x+3}\right)dx =$$

$\longrightarrow 138\int \frac{1}{x+3}\,dx$

$$\boxed{\frac{4x^3}{3}-\frac{17x^2}{2}+46x-138\,\mathrm{Ln}|x+3|+K}$$

b) $$\int \frac{x^3+3x-1}{\sqrt{x}}\,dx = \int \frac{x^3}{x^{1/2}}\,dx + \int \frac{3x}{x^{1/2}}\,dx - \int \frac{1}{x^{1/2}}\,dx =$$

$$\int x^{\frac{5}{2}}\,dx + 3\int x^{1/2}\,dx - \int x^{-1/2}\,dx =$$

$$\frac{x^{7/2}}{\frac{7}{2}} + 3\,\frac{x^{3/2}}{\frac{3}{2}} - \frac{x^{1/2}}{1/2} + K =$$

$$\frac{2\sqrt{x^7}}{7} + 2\sqrt{x^3} - 2\sqrt{x} + K =$$

$$\boxed{\frac{2x^3\sqrt{x}}{7} + 2x\sqrt{x} - 2\sqrt{x} + K}$$

EJERCICIO 2

a) **REPRESENTAR** $f(x) = x^2 - 4x + 4$

<u>CORTE CON EJE X</u> $(f(x)=0)$

$x^2 - 4x + 4 = 0$ $\quad x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4\cdot 1\cdot 4}}{2\cdot 1} = \begin{cases} 2 \\ 2 \end{cases}$ $(2,0)$

CORTE CON EJE Y $(x=0)$

$f(0)=4$ $\quad (0,4)$

VÉRTICE

$f'(x)=2x-4 \qquad 2x-4=0 \qquad x=2 \qquad (2,f(2))=(2,0)$

$\boxed{\text{REPRESENTAR } g(x)=-x^2+4}$

CORTE CON EJE X $(g(x)=0)$

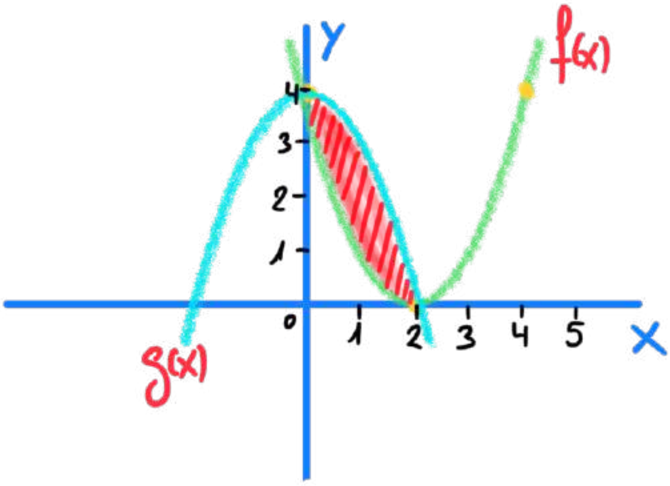
$-x^2+4=0 \qquad x^2=4 \qquad x=\pm 2 \qquad (2,0)$ y $(-2,0)$

CORTE CON EJE Y $(x=0)$

$g(0)=+4$ $\quad (0,4)$

VÉRTICE

$g'(x)=-2x \qquad -2x=0 \qquad x=0 \qquad (0,g(0))=(0,4)$



ⓑ LÍMITES DE INTEGRACIÓN

$$f(x) = g(x)$$

$$x^2 - 4x + 4 = -x^2 + 4$$

$$2x^2 - 4x = 0$$

$$x(2x-4) = 0 \quad \begin{cases} x = 0 \\ x = 2 \end{cases}$$

$$\int_0^2 (g(x) - f(x))\,dx = \int_0^2 (-x^2 + 4 - x^2 + 4x - 4)\,dx =$$

$$\int_0^2 (-2x^2 + 4x)\,dx = \left.\frac{-2x^3}{3} + \frac{4x^2}{2}\right]_0^2 =$$

$2x^2$

$$\left(\frac{-2 \cdot 2^3}{3} + 2 \cdot 2^2\right) - (0) = -\frac{16}{3} + 8 = \frac{8}{3}\ m^2$$

$$\frac{8}{3}\ m^2 \cdot 18500 = 49333'33 \text{ euros}$$ $\boxed{\text{PRECIO TERRENO}}$

ALBERTO **NO** ESTABA EN LO CIERTO.

EJERCICIO 3

$$f(x)=(x^2-a)e^x+bx \begin{cases} \text{P.INF.}: x=0 & f''(0)=0 \\ \text{MÍNIMO RELATIVO}: x=1 & f'(1)=0 \end{cases}$$

ⓐ $f'(x)=2xe^x+(x^2-a)e^x+b=(x^2+2x-a)e^x+b$

$$f''(x)=(2x+2)e^x+(x^2+2x-a)e^x=(x^2+4x+2-a)e^x$$

$$f'(1)=0 \Rightarrow (1^2+2\cdot 1-a)e^1+b=0 \Rightarrow (3-a)e+b=0$$

$$f''(0)=0 \Rightarrow (0^2+4\cdot 0+2-a)e^0=0 \Rightarrow 2-a=0 \Rightarrow \boxed{a=2}$$

$$(3-2)e+b=0$$

$$e+b=0 \Rightarrow \boxed{b=-e}$$

• SI $a=2$ y $b=-e$, $f(x)$ CUMPLE LAS CONDICIONES SOLICITADAS. $\boxed{f(x)=(x^2-2)e^x-ex}$

ⓑ RECTA TANGENTE $t(x)$

$$t(x)-f(x_0)=f'(x_0)\cdot(x-x_0) \qquad x_0=2$$

$$f(2)=(2^2-2)e^2-e\cdot 2 \Rightarrow 2e^2-2e \simeq 9'34$$

$$f'(2)=(2^2+2\cdot 2-2)e^2-e=6e^2-e\simeq 41'62$$

$$t(x)-(2e^2-2e)=(6e^2-e)(x-2)$$

$$t(x)=(6e^2-e)x-12e^2+\cancel{2e}+2e^2-\cancel{2e}$$

$$t(x)=(6e^2-e)x-10e^2\simeq\boxed{41'62x-73'89}$$

EJERCICIO 4

$$f(x)=\frac{2x^2-3x}{e^x}$$

$$D=\mathbb{R}$$

$$f'(x)=\frac{(4x-3)\cdot e^x-(2x^2-3x)\cdot e^x}{(e^x)^2}=\frac{\cancel{e^x}(-2x^2+7x-3)}{(e^x)^{\cancel{2}}}$$

$$=\frac{-2x^2+7x-3}{e^x}$$

$$f'(x)=0\implies -2x^2+7x-3=0$$

$$x=\frac{-7\pm\sqrt{(7)^2-4\cdot(-2)\cdot(-3)}}{2\cdot(-2)}=\frac{-7\pm\sqrt{25}}{-4}=\begin{cases}3\\ \frac{1}{2}\end{cases}$$

MONOTONÍA

$-\infty$		$\frac{1}{2}$		3		$+\infty$
	$f'(x) < 0$		$f'(x) > 0$		$f'(x) < 0$	
	DECRECE		CRECE		DECRECE	
		Mínimo		Máximo		
		$\left(\frac{1}{2}, -0'61\right)$		$(3, 0'45)$		

$\left(-\infty, \frac{1}{2}\right) \cup (3, +\infty)$ DECRECIENTE

$\left(\frac{1}{2}, 3\right)$ CRECIENTE

$M_1\left(\frac{1}{2}, -0'61\right)$ Mínimo Relativo

$M_2(3, 0'45)$ Máximo Relativo