Aplicaciones de la derivada (i)

martes, 21 de abril de 2020 10:18

$f(x) = x^3 - 3x^2 - 6x + 8$ (¿cómo se representa?)

$g(x) = -x^2 + 5x + 6$

↓

Representar: Tabla de valores

x	$f(x)$
0	$f(0) = 8$
1	$f(1) = 0$
2	$f(2) =$
3	$f(3) =$
-3	$f(-3) = -28$

$$\begin{array}{c|cccc} & 1 & -3 & -6 & 8 \\ 1 & & 1 & -2 & -8 \\ \hline & 1 & -2 & -8 & \boxed{0} \end{array}$$

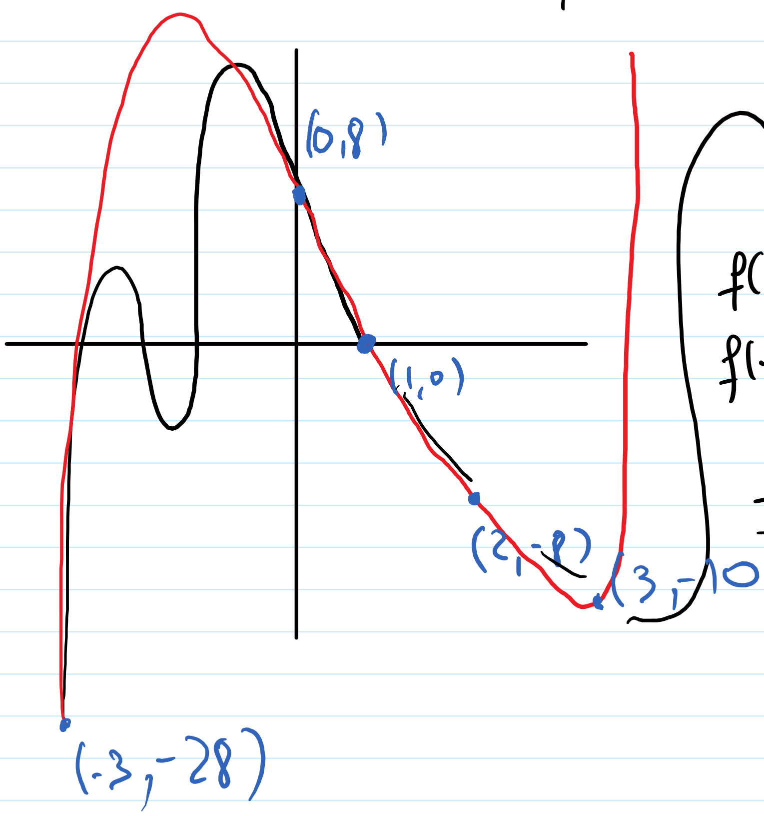
$$\begin{array}{c|cccc} & 1 & -3 & -6 & 8 \\ 2 & & 2 & -2 & -16 \\ \hline & 1 & -1 & -8 & \boxed{-8} \end{array}$$

$$\begin{array}{c|cccc} & 1 & -3 & -6 & 8 \\ 3 & & 3 & 0 & -18 \\ \hline & 1 & 0 & -6 & \boxed{-10} \end{array}$$

$f(3) = 3^3 - 3 \cdot 3^2 - 6 \cdot 3 + 8 = -10$

$f(-3) = (-3)^3 - 3(-3)^2 - 6(-3) + 8 = -28$

$$\begin{array}{c|cccc} & 1 & -3 & -6 & 8 \\ -3 & & -3 & +18 & -36 \\ \hline & 1 & -6 & +12 & \boxed{-28} \end{array}$$



PASO) $f(x) = x^3 - 3x^2 - 6x + 8$

① $D(f) = \mathbb{R} \Rightarrow f$ NO TIENE ASÍNTOTAS VERTICALES

$\exists f(x) \ \forall x \in \mathbb{R}$

② $\mathrm{Im}(f) = \mathbb{R}$

③ CORTES CON OX

$f(x) = 0 \qquad x^3 - 3x^2 - 6x + 8 = 0$

FACTORIZAR

$x^3 - 3x^2 - 6x + 8$

	1	-3	-6	8
+1		1	-2	-8
	1	-2	-8	$\boxed{0}$

$\boxed{x = 1 \text{ SOLUCION}}$

(cociente)

El alumno solo puede encontrar las soluciones ENTERAS

$DIV(8) = \{\pm 1, \pm 2, \pm 4, \pm 8\}$

$x^3 - 3x^2 - 6x + 8 = (x - 1)(x^2 - 2x - 8)$

$x^2 - 2x - 8 = 0 \qquad \boxed{x = +4} \ \boxed{x = -2}$

$x^3 - 3x^2 - 6x + 8 = (x - 1)(x - 4)(x + 2)$

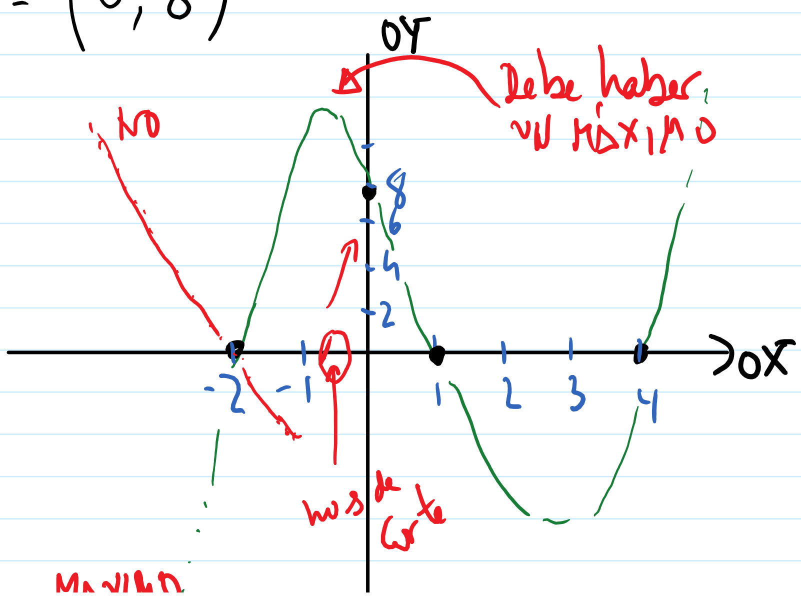
LA GRÁFICA de f CORTA AL EJE OX

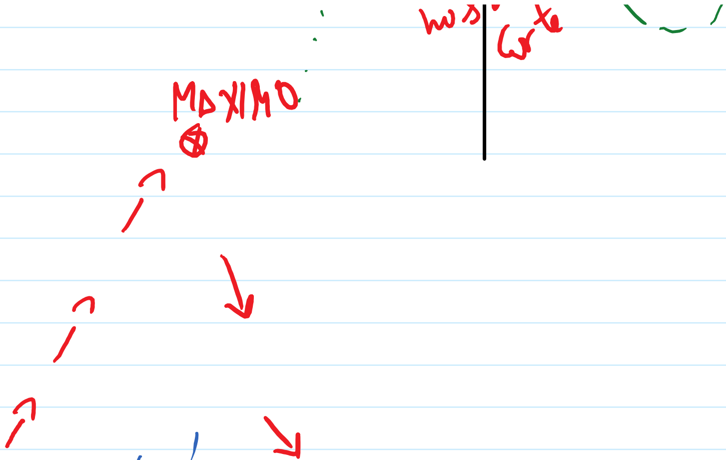
EN $\quad x = -2 \quad x = 1 \quad x = 4$

$(-2, 0) \ (1, 0) \ (4, 0)$

④ CORTE OY (Ordenada en el origen)

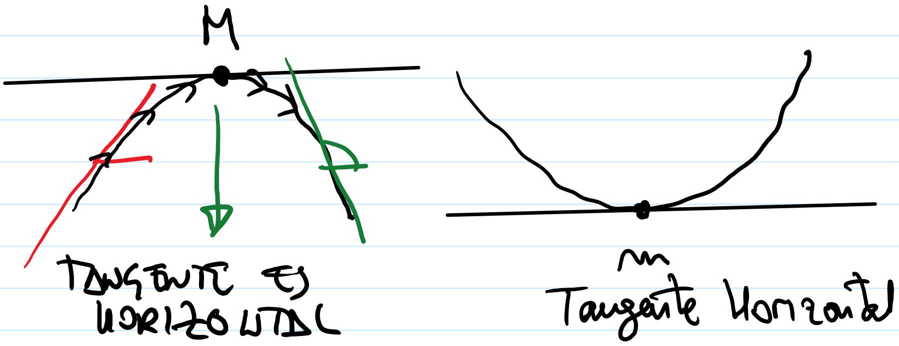
$(0, f(0)) = (0, 8)$





⑤ MAXIMO/MINIMOS de f

EXTREMOS



$m = 0$

$f'(\text{MAXIMO}) = 0 \qquad f'(\text{minimo}) = 0$

$f(x) = x^3 - 3x^2 - 6x + 8$

$f'(x) = 3x^2 \quad - 3\cdot 2x \quad -6 \quad 0 \quad = 3x^2 - 6x - 6$

$f'(\text{MAX}) = 3\cdot \text{MAX}^2 - 6\cdot \text{MAX} - 6 = 0$

$f'(\text{min}) = 3\cdot \text{min}^2 - 6\,\text{min} - 6 = 0$

$3x^2 - 6x - 6 = 0$

$x^2 - 2x - 2 = 0 \qquad x = \dfrac{2 \pm \sqrt{4+8}}{2} = \dfrac{2 \pm \sqrt{12}}{2} =$

$$x^2 - 2x - 2 = 0 \qquad x = \frac{2 \pm \sqrt{4+8}}{2} = \frac{2 \pm \sqrt{12}}{2} =$$

$$= \frac{2 \pm 2\sqrt{3}}{2} = \begin{cases} 1+\sqrt{3} = 2'73 \\ 1-\sqrt{3} = -0'73 \end{cases}$$

Si f tiene algún MAX ó mínimo, esos puntos serán $x = 2'73$ y $x = -0'73$

$f(2'73) = -10'39$

$f(-0'73) = 10'39$