# FUNCTIONS TEST – 4º ESO

Exercise 1: (1.5 ptos) Given the following graph of a certain function (the distance between consecutive marks in the axes is one):
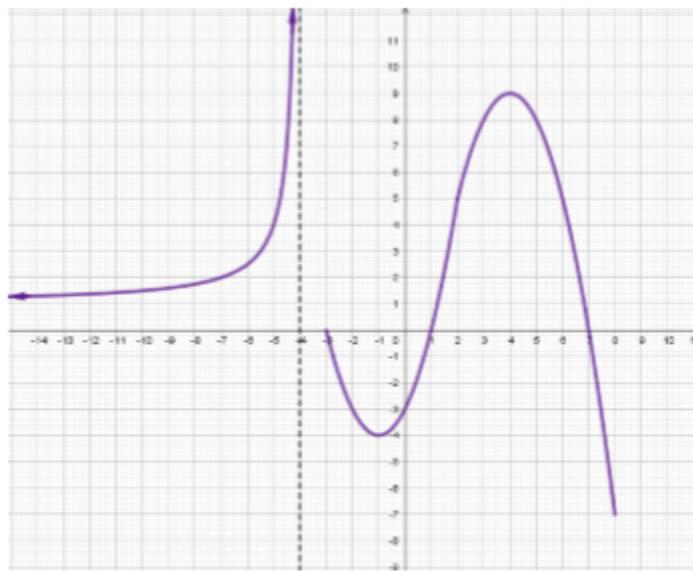
a) Indicate the domain and the image $\text{Dom } f = (-\infty, -4) \cup [-3, 8]$ $\qquad \text{Im } f = [-7, +\infty)$

b) Study the monotony **Increases:** $(-\infty, -4) \cup (-1, 4)$ $\qquad$ **Decreases:** $(-3, -1) \cup (4, 8)$

c) Indicate the relative and absolute extrema

Relative maxima: $x = -3, \quad x = 4$ $\qquad$ **Absolute maximum:** $\nexists$

Relative minima: $x = -1, \quad x = 8$ $\qquad$ **Absolute minimum:** $x = 8$

Exercise 2: (2 ptos) Find the domain of the following functions:

a) $f(x) = \dfrac{x^2 + 7x + 6}{x^2 - 9} \quad \rightarrow \quad \text{Dom } f = \mathbb{R} - \{\pm 3\}$ $\hfill$ (0.5)

b) $f(x) = \dfrac{1}{\sqrt{x^2 + x - 6}} \quad \rightarrow \quad \text{Dom } f = (-\infty, -3) \cup (2, +\infty)$ $\hfill$ (0.75)

c) $f(x) = \dfrac{\sqrt{x+1}}{x^2 - 4} \quad \rightarrow \quad \text{Dom } f = [-1, 2) \cup (2, +\infty)$ $\hfill$ (0.75)

Exercise 3: (2 ptos) Work out:

a) $\displaystyle\lim_{x \to 2} \dfrac{1-x}{x-2} = \nexists$ $\hfill$ (0.5)

b) $\displaystyle\lim_{x \to 1} \dfrac{x^2 - 2x + 1}{x^2 + 2x - 3} = 0$ $\hfill$ (0.75)

c) $\displaystyle\lim_{x \to +\infty} \left(\dfrac{x^2 - 2x}{x+1} - x \right) = -3$ $\hfill$ (0.75)

Exercise 4: (0.75 ptos) Find the **general** equation of the straight line that goes through the points $A(-7,2)$ and $B(5,4)$ $\qquad$ $x-6y+19=0$

Exercise 5: (1 pto) Plot the graph of the function $f(x)=-x^2-2x+8$, finding the points where it crosses the axes, the coordinates of the vertex and as many more points as necessary
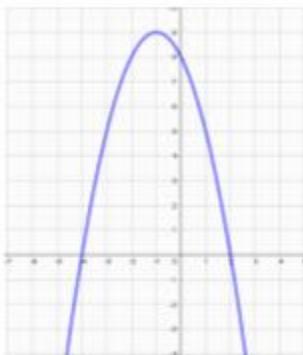
Exercise 6: (1 pto) Find the asymptotes of the following functions:

a) $f(x)=\dfrac{3x^2-7x+1}{x^2-25}$ $\rightarrow$ $\begin{cases} \underline{HA} & y=3 \\ \underline{VA} & x=\pm 5 \end{cases}$

b)
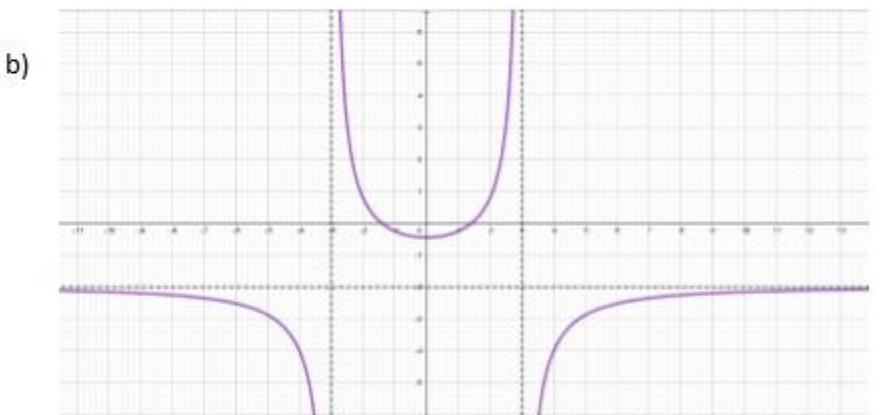
$\begin{cases} \underline{HA} & y=-2 \\ \underline{VA} & x=\pm 3 \end{cases}$

Exercise 7: (1.75 ptos) Sketch the graph of the piecewise function:

$$f(x)=\begin{cases} x+3 & x\leq -1 \\ x^2-4 & -1<x<3 \\ 5 & 3\leq x<7 \end{cases}$$