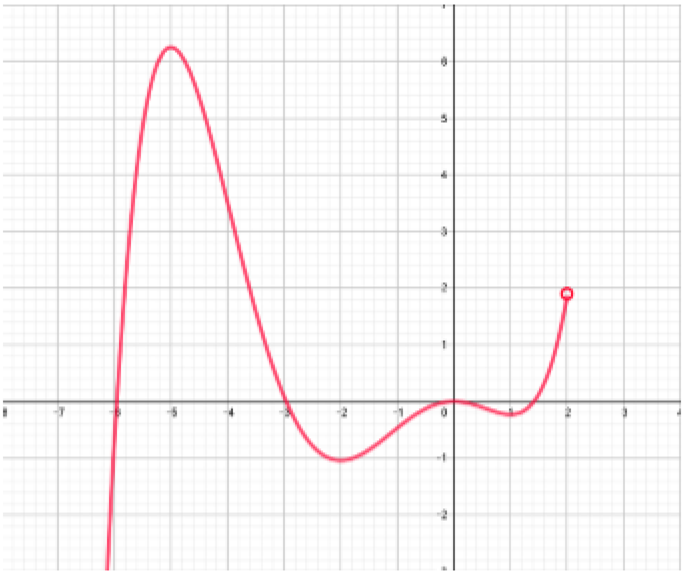
FUNCTIONS – 4º ESO

Exercise 1: (1.25 points) Given the graph of the following function



a) Study the domain and the image of the function $\text{Dom } f = (-\infty, 2)$ $\text{Im } f = (-\infty, 6.25]$

b) Study its monotony Increases: $(-\infty,-5)\cup(-2,0)\cup(1,2)$ Decreases: $(-5,-2)\cup(0,1)$

c) Indicate the relative and absolute extrema

Relative minima: $x=-2,\ x=1$ Absolute minimum: $\nexists$

Relative maxima: $x=-5,\ x=0$ Absolute maximum: $x=-5$

Exercise 2: (0.5 points) Work out the equation of the straight line that passes through the points $P(5,-2)$ and $Q(7,4)$ $\boxed{y=3x-17}$

Exercise 3: (1.5 points) Calculate the value of the following logarithms

a) $\log_2 0.0625 = -4$

b) $\log_7 343 = 3$

c) $\dfrac{\log_5 9}{\log_5 81} = \dfrac{1}{2}$

d) $\dfrac{\log 20 + \log 50}{\log 80 - \log 8} = 3$

Exercise 4: (1.5 points) Find the domain of the functions:

a) $f(x)=\sqrt{x^2+4x+3} \rightarrow \text{Dom } f = (-\infty,-3]\cup[-1,+\infty)$

b) $g(x)=\dfrac{\sqrt[3]{x^2-16}}{x^2-9} \rightarrow \text{Dom } f = \mathbb{R}-\{\pm 3\}$

c) $h(x)=\dfrac{\sqrt{x+2}}{x^2-6x+9} \rightarrow \text{Dom } f = [-2,3)\cup(3,+\infty)$

Exercise 5: (1.5 points) Work out the value of these limits

a) $\lim\limits_{x \to 1} \dfrac{x^2 - 3}{x^2 + x - 2} = \nexists$

b) $\lim\limits_{x \to 3} \dfrac{x^2 + 2x - 15}{x^2 - 9} = \dfrac{4}{3}$

c) $\lim\limits_{x \to +\infty} \left(x - \dfrac{x^2 + 3}{x - 1} \right) = -1$

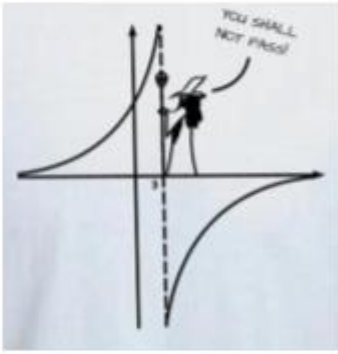
Exercise 6: (0.75 points) Find the asymptotes of the following functions:

a) $f(x) = \dfrac{5x^2 - 3x}{x^2 - 1}$

HA $y = 5$

VA $x = \pm 1$

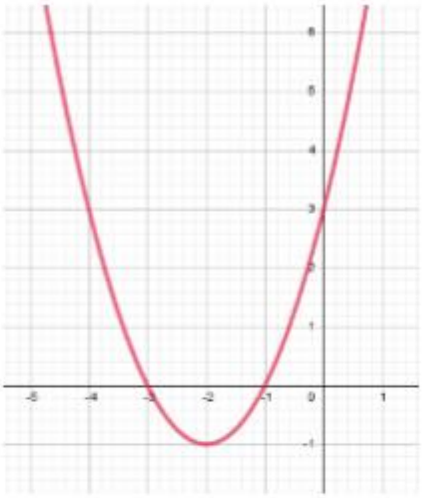
b)



HA $y = 0$

VA $x = 3$

Exercise 7: (1 point) Plot the graph of the parabola $f(x) = x^2 + 4x + 3$, finding the points where it crosses the axes and the coordinates of the vertex.



Exercise 8: (2 points) Sketch the graph the piecewise function given below:

$$f(x)=\begin{cases} x+3 & x<-1 \\ 2^x & -1\le x<3 \\ \dfrac{8}{x-2} & 3\le x<10 \end{cases}$$

With a different color or a dotted line, and over the same set of axes, draw the graph of $|f(x)|$