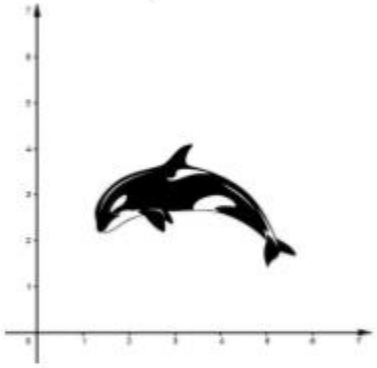
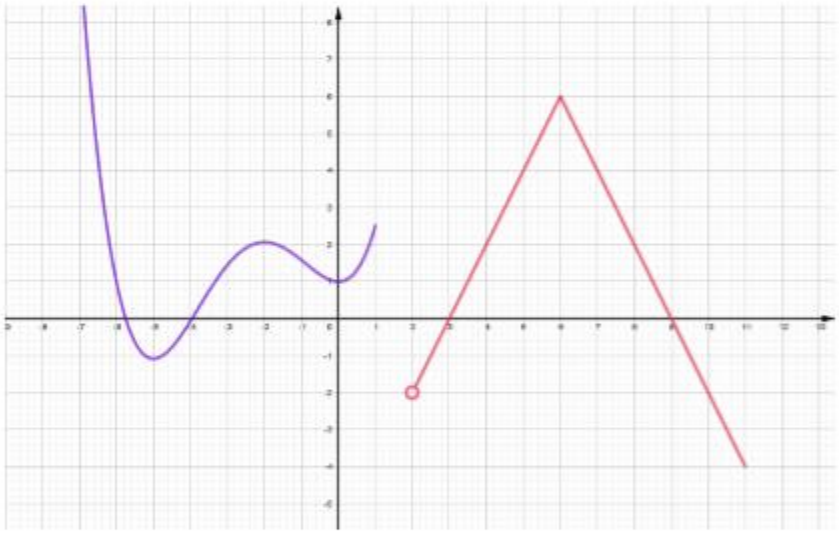
EQUATIONS AND FUNCTIONS

3º ESO

Exercise 1: (0.5 ptos) Plot a graph that doesn't represent a function.



Exercise 2: (3 points) Given the graph of the following function, indicate its domain and image, the points where it crosses the axes, study its monotony and the relative and absolute extrema



$\text{Dom } f = (-\infty, 1] \cup (2, 11]$ $\quad$ $\text{Im } f = [-4, +\infty)$

OX $\quad x = -5.75,\ x = -4,\ x = 3,\ x = 9$

OY $\quad y = 1$

Increases: $(-5, -2)$ and $(0, 1)$ and $(2, 6)$

Decreases: $(-\infty, -5)$ and $(-2, 0)$ and $(6, 11)$

Relative maxima: $x = -2,\ x = 1,\ x = 6$ $\quad$ Absolute maximum: $\nexists$

Relative minima: $x = -5,\ x = 0,\ x = 11$ $\quad$ Absolute minimum: $x = 11$

Exercise 3: (2 ptos) Find the domain of the following functions:

a) $f(x)=\dfrac{x^2+3x-1}{x^2-9} \rightarrow \text{Dom } f=\mathbb{R}-\{\pm 3\}$ (0.75)

b) $f(x)=\sqrt[78]{x+5} \rightarrow \text{Dom } f=[-5,+\infty)$ (0.5)

c) $f(x)=\dfrac{x}{\sqrt{x-7}} \rightarrow \text{Dom } f=(7,+\infty)$ (0.75)

Exercise 4: (3.75 points) Given the following polynomials, find their roots and factorization:

a) $P(x)=x^5-26x^3+25x$

Roots: $x=0,\ x=-1,\ x=1,\ x=-5,\ x=5$

Factorization: $x(x+1)(x-1)(x+5)(x-5)$

b) $P(x)=x^4+11x^3+41x^2+61x+30$

Roots: $x=-1,\ x=-2,\ x=-3,\ x=-5$

Factorization: $(x+1)(x+2)(x+3)(x+5)$

c) $P(x)=x^5-4x^4+5x^3-2x^2$

Roots: $x=0$ double, $x=1$ double, $x=2$

Factorization: $x^2(x-1)^2(x-2)$

Exercise 5: (0.75 points) Find the value of k so that when dividing $P(x)=kx^3-5x^2+3x-7$ by $(x-2)$ the remainder is 19 $\rightarrow$ $k=5$