

MATH 30 - Precalculus.

First test. Time allowed: one hour. Professor Luis Fernández

NAME: _____

[8] **1.** Answer whether each of the following statements is true or false, and justify your answer.

NOTE: answers without justification will **not** receive *any* credit.

a) The graph of a function can have two different y -intercepts.

b) The graph of a function can have no x -intercepts

c) The function $f(x) = \frac{1}{x^2 + 3}$ is an even function.

d) The number 5 is in the domain of the function $h(x) = \sqrt{3 - x}$.

[8] **2.** Find the inverse of the function $f(x) = 1 + \frac{2}{x - 3}$.

[10] **3.** If $f(x) = x^2 - 1$ and $g(x) = 2x + 3$ find (you do not need to simplify)

a) $(f + g)(x) =$

b) $\left(\frac{f}{g}\right)(x) =$

c) $(f \circ g)(x) =$

d) $(g \circ f)(x) =$

e) $(g \circ f \circ g)(x) =$

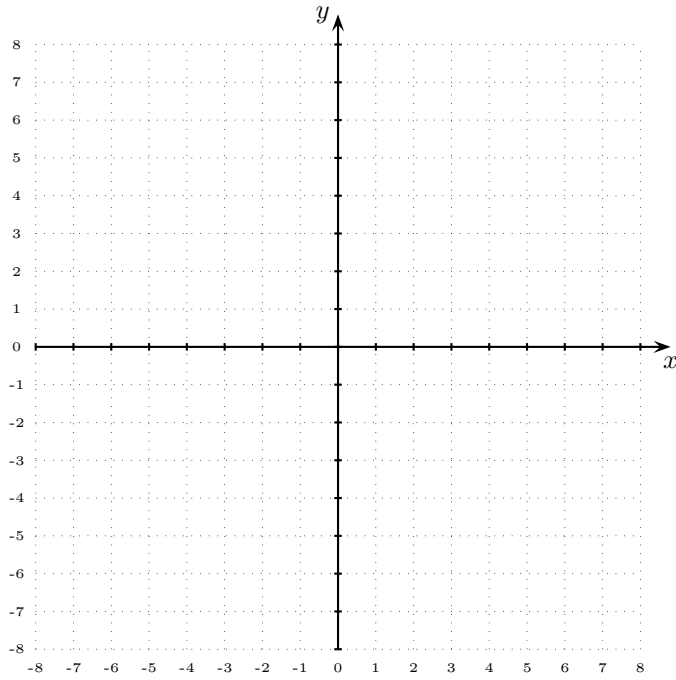
[12] **4.** Consider the functions $f(x) = \frac{2}{x-1}$ and $g(x) = 1 + \frac{2}{y}$.

a) Find $(f \circ g)(x)$ and $(g \circ f)(x)$ and simplify in order to verify that g is the inverse of f .

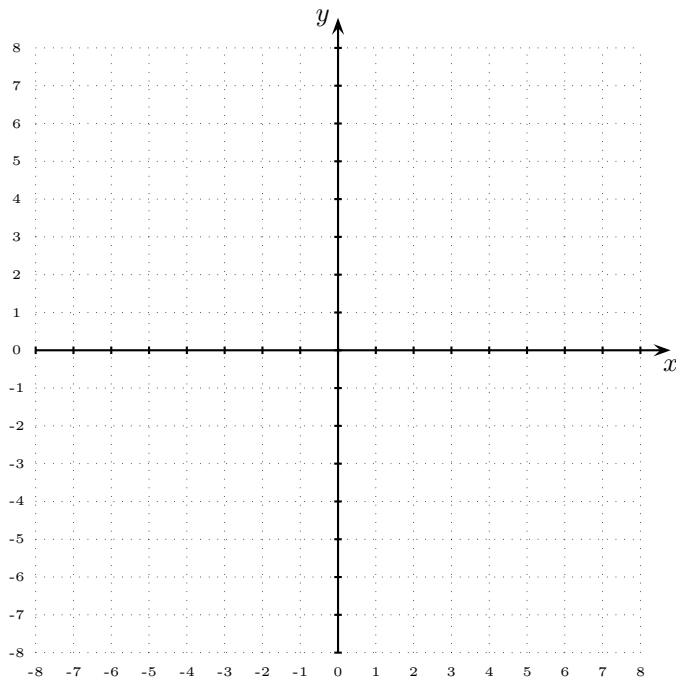
b) Find the domain and range of f .

c) Find the domain and range of g .

- [8] **5.** Find the vertex and intercepts of the graph of the quadratic function $f(x) = -2x^2 + 7x + 4$. Do a sketch of the graph of f in the coordinate axes below.

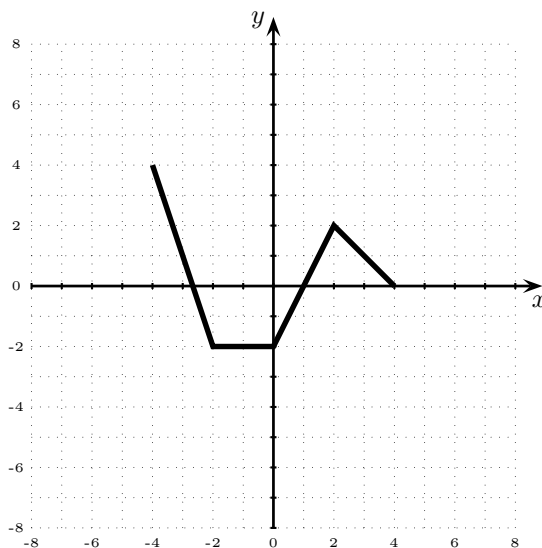


- [8] **6.** Plot the graph of the function $f(x) = -3x^6 - 3x^5 + 15x^4 - 9x^3 = -3x^3(x-1)^2(x+3)$. It must be clear what is the end behaviour, the y -intercept, and the x -intercepts with their multiplicity. Use the axes below.

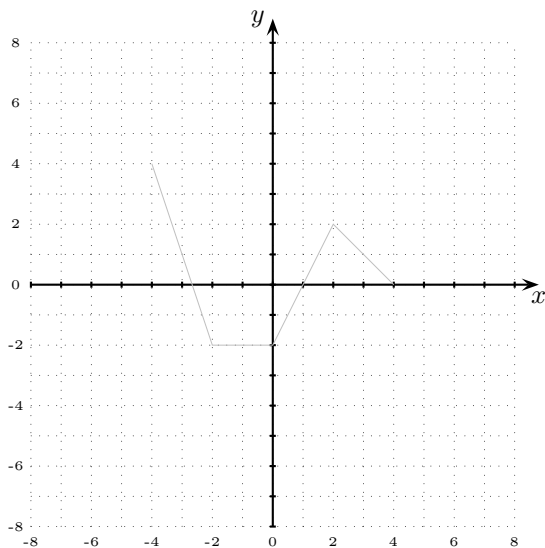


- [10] 7. The following is the graph of the function f . In the coordinate axes given below, sketch the graph of the indicated functions. As a reference, the graph of f is given in each coordinate axes in light gray.

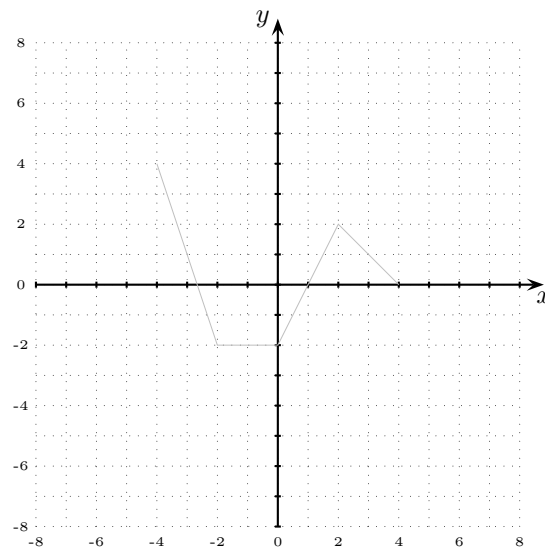
The graph of the function f is:



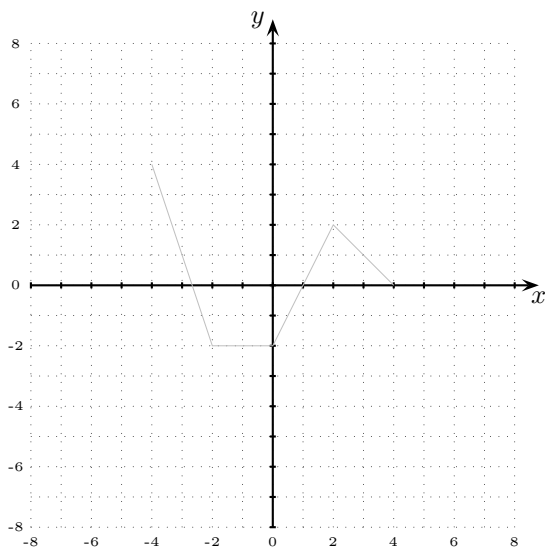
- a) Graph g , where $g(x) = f(x + 3) - 2$.



- b) Graph h , where $h(x) = f(2x)$.



- c) Graph i , where $i(x) = 2f(-x)$.



- d) Graph j , where $j(x) = -f(x/2)$.

