

MATH 30 - Precalculus, Sec. 2503

First test. Time allowed: two hours. Professor Luis Fernández

NAME: _____

[20] 1. Answer the following questions, justifying your answer.

a) Suppose that the functions f and g are inverses of each other. If $f(3) = 6$, how much is $g(6)$, and **why**?

b) Let f be the function defined by: $f(x) = \begin{cases} -2x & \text{if } x \leq 3 \\ x + 2 & \text{if } x > 3 \end{cases}$. Find $f(-2)$, $f(3)$, and $f(5)$.

c) Is the function $f(x) = x^2 + 1$ injective, and **why**?

d) Is the function $f(x) = \frac{3x^2 - 7}{3x^2}$ even, odd or neither, and **why**?

[12] **2.** For $f(x) = 4x - 1$, find and simplify: $\frac{f(x+h) - f(x)}{h}$.

[16] **3.** Find the domain of the function $f(x) = \frac{1}{x-4} + \sqrt{x+2}$.

[14] 4. Use the graph of the function f given below to find

a) $f(-1) =$

b) $f(2) =$

c) $(f \circ f)(1) =$

d) The domain of f .

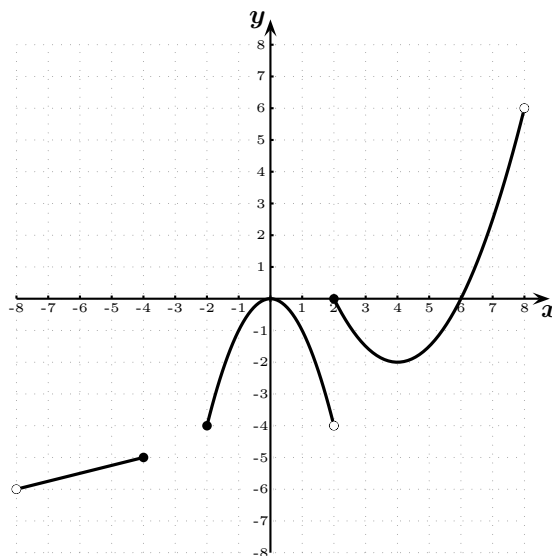
e) The range of f .

f) The interval(s) where f is increasing.

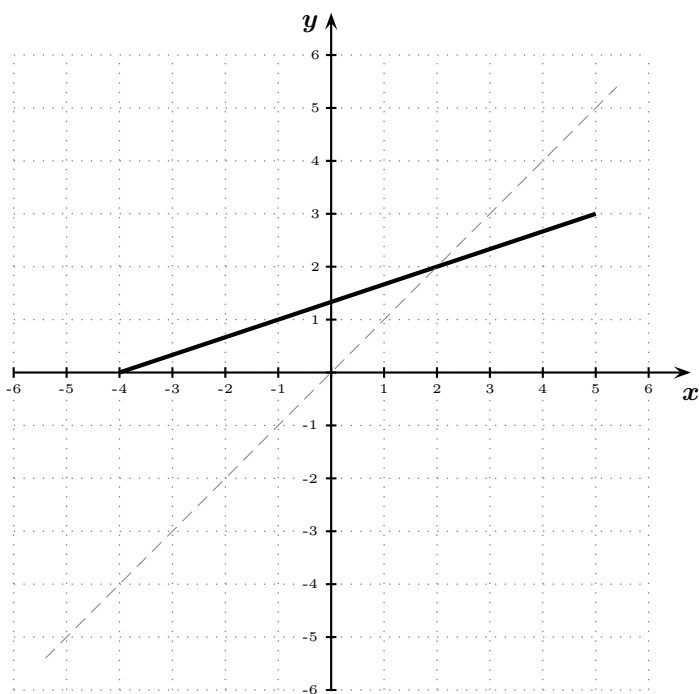
g) The interval(s) where f is decreasing.

h) The relative maxima of f .

i) The relative minima of f .



[8] 5. The graph of the function h is given below. Sketch the graph of h^{-1} in the same coordinate axes.



[16] **6.** Consider the functions $f(x) = 3 + \frac{4}{x}$ and $g(x) = \frac{4}{x-3}$.

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 of f .

c) Find the domain of g .

Recall that the range of a function is equal to the domain of its inverse. With this in mind,

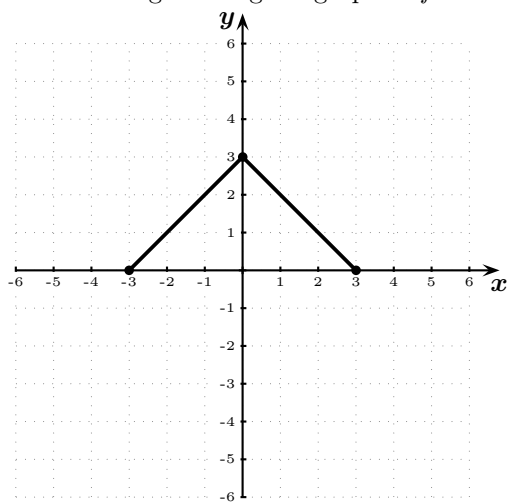
d) Find the range of f .

e) Find the range of g .

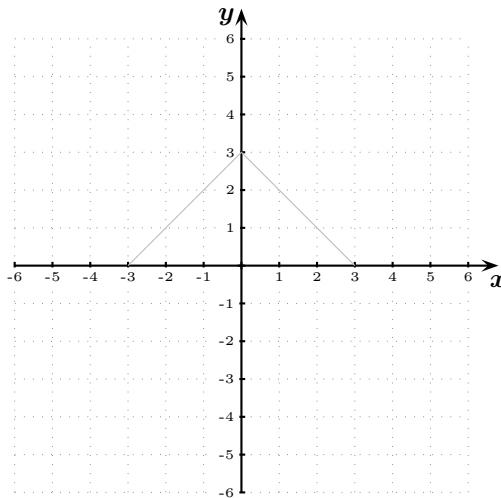
[15] **7.** If $f(x) = \frac{x-2}{3x}$, find $f^{-1}(x)$.

- [10] 8. 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.)

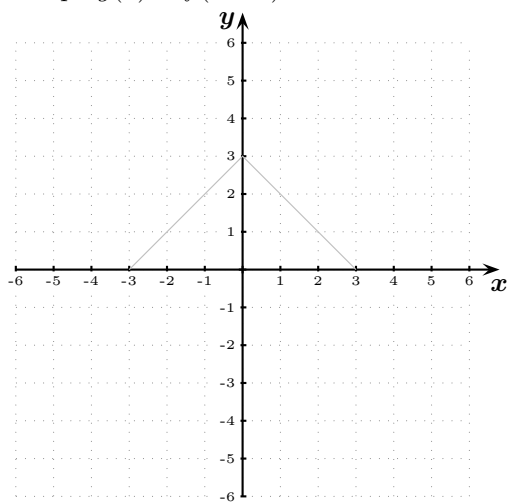
This is the given original graph of f .



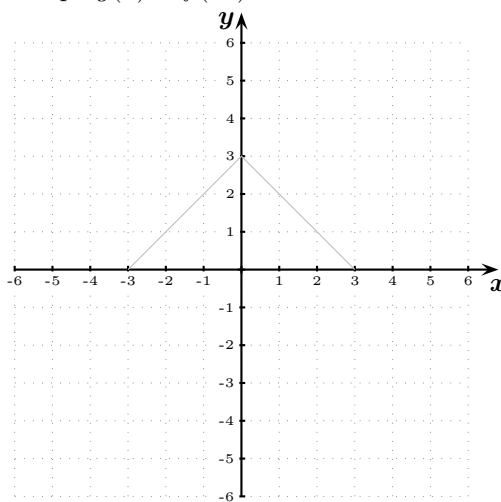
- a) Graph $g(x) = f(x) - 1$.



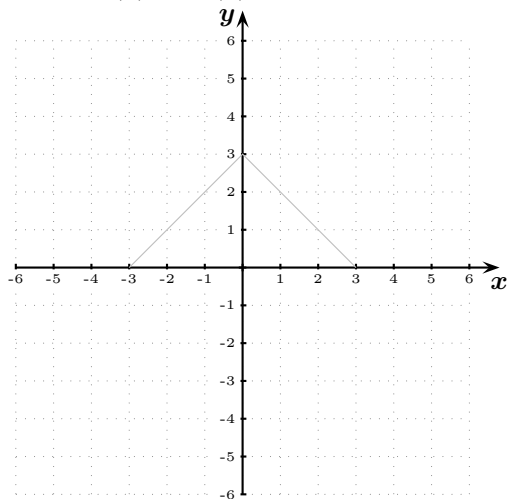
- b) Graph $g(x) = f(x + 2)$.



- c) Graph $g(x) = f(2x)$.



- d) Graph $g(x) = 2f(x)$.



- e) Graph $g(x) = -f(x - 2)$.

