MATH 30 - Precalculus, Sec. 2497

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

NAME:_____

[15] **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) There is a function whose graph is the vertical line given by $x = 1$.

b) The function $f(x) = \dfrac{4x}{x^2 + 2}$ is an even function.

c) The number 6 is in the domain of the function $h(x) = \sqrt{5 - x}$.

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[12] **2.**   Use the graph of the function f given below to find

a) $f(2) =$

b) $f(-6) =$

c) $(f \circ f)(-5) =$
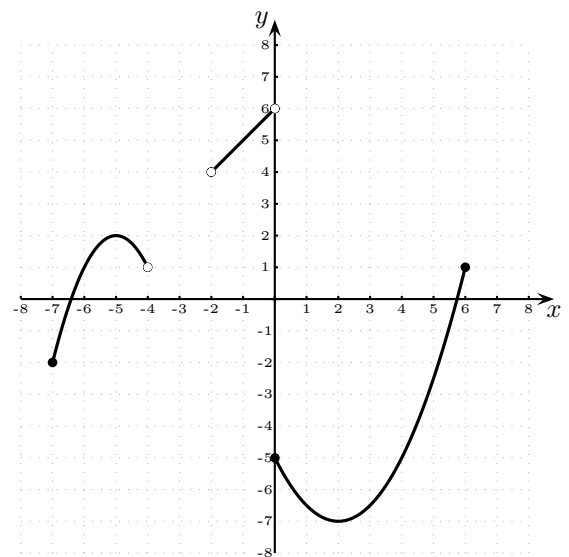
d) The domain of f.

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.

[18] **3.** For the function $f(x) = (x-2)^2 - 1$,

  a) Find the vertex and the x- and y-intercepts.

  b) Write down the equation of the axis of symmetry.

  c) Sketch the graph on the coordinate axes below.

  d) Is the function one-to-one? If not, find an interval where the function is one-to-one.

  e) [BONUS] Consider the function f with its domain restricted to the interval you found in part d). Since f is one-to-one in that interval, it has an inverse. Find it and graph in the same axes.
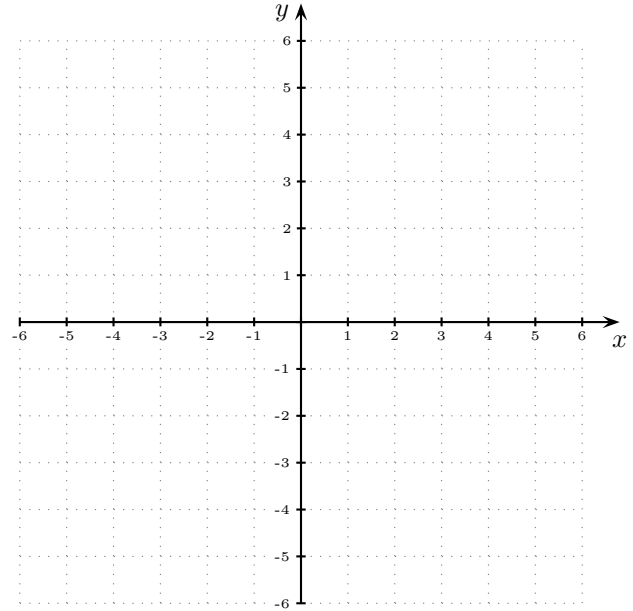
[16] **4.** Consider the functions $f(x) = \dfrac{2}{x-5}$ and $g(x) = \dfrac{2}{x} + 5$.

  a) Find $(f \circ g)(y)$ 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.

[15] **5.** Find the inverse of the function $f(x) = -2 + \dfrac{1}{x+1}$.

[16] **6.** Let $f(x) = \dfrac{2}{x-2}$ and $g(x) = \sqrt{x-1}$.

    a) Find the domain of g.

    b) Find the domain of f.

    c) Find the values of x such that $g(x)$ is NOT in the domain of f found in part b).

    d) Find the domain of $f \circ g$.

[15] **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.)
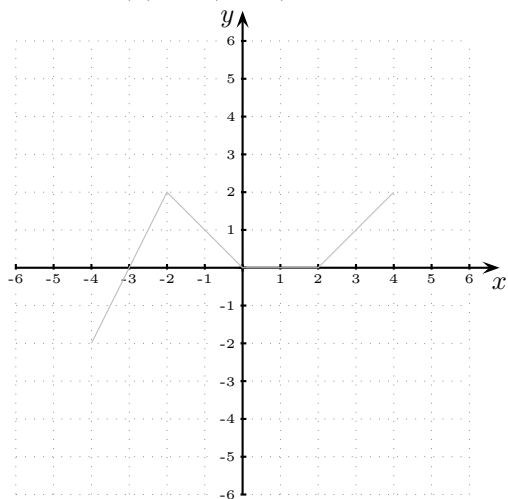
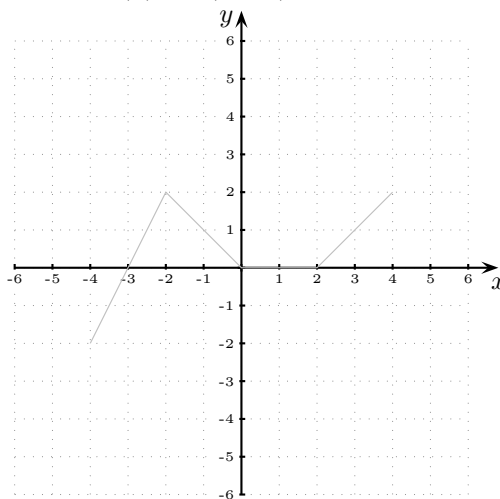This is the given original graph of f.
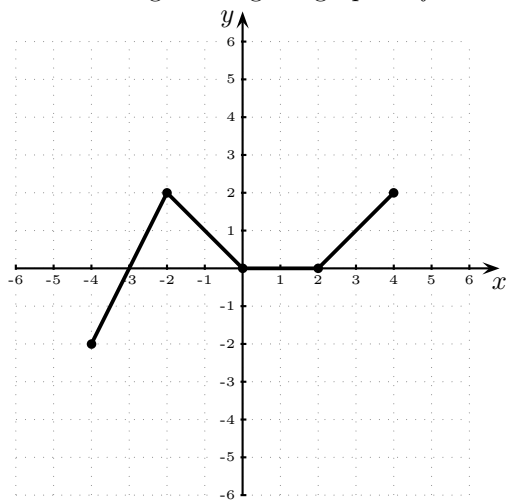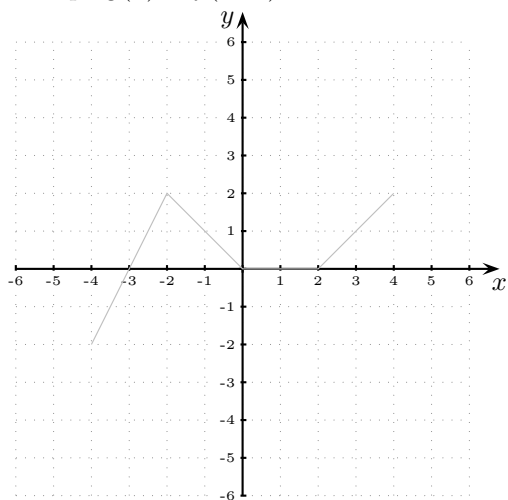
a) Graph $g(x) = f(x) - 3$.
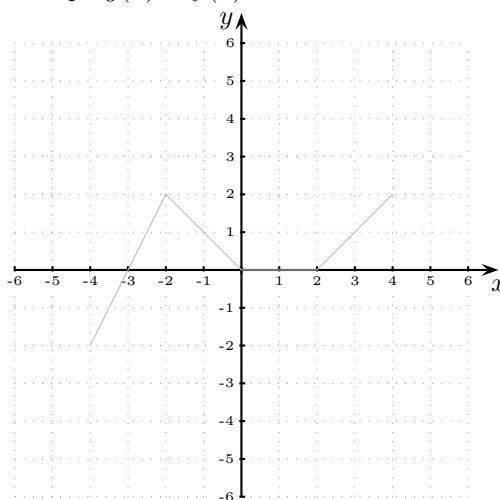
b) Graph $g(x) = f(x - 1)$.

c) Graph $g(x) = f(x + 2) + 3$.

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

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

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