

## HW #1

Kerry Ojakian's MTH 30 Class

Due Date: Tuesday February 25

### General Instructions:

- Homework must be stapled, be relatively neat, and have your name on it.
- Use tutors, work with other students, but ... don't copy!

### The Assignment

1. Let  $h(x) = 5 + 2x^3$ . Evaluate  $h(2)$  and  $h(-2)$ .

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2. Consider the piecewise defined function given by  $f(x) = \begin{cases} x & \text{if } x < -2 \\ 2x - 1 & \text{if } -2 \leq x \leq 3 \\ -4x & \text{if } x > 3 \end{cases}$

Find the following values.

(a)  $f(-5) =$

(d)  $f(3) =$

(b)  $f(-2) =$

(c)  $f(0) =$

(e)  $f(4) =$

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3. Consider the function  $f$  given by the following table.

$x$	2	4	6	17	15	10
$f(x)$	-3	4	-13	2	0	14

(a) Evaluate  $f(17)$

(c) For what  $x$  does  $f(x) = -13$

(b) Evaluate  $f(2)$

(d) Solve  $f(x) = 6$ .

4. For the function  $f(x) = \frac{3x^2 - 1}{x^2}$ , find (and simplify when possible)

(a)  $f(2) =$

(d)  $f(x - 1) =$

(b)  $f(-1) =$

(e)  $f(-x) =$

(c)  $f(r) =$

(f)  $f(x^3) =$

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5. Consider the equation  $6t = 8y + 4$ . Write  $y$  as a function of  $t$ .

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6. Suppose that  $f(x) = 7 - 2x$ . Solve  $f(x) = 11$ .

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7. Draw a graph which is a function but not one-to-one. Why is it a non one-to-one function?

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8. Consider the following two relations. For each one, is it a function or not?

(a)  $\{(2, 4), (4, 2), (3, 4), (1, 1)\}$

(b)  $\{(2, 4), (3, 5), (2, 6), (7, 9)\}$

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9. **Solve the inequality and graph its solution.**

$-8 - 7x > -1$

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10. Let  $f(x) = \frac{x(9 + 6x)(x - 5)}{4(x - 113)(3x + 66)}$ .

- (a) Evaluate  $f(0)$ .
  - (b) When is the function undefined?
  - (c) What is the domain of the function?
  - (d) Which  $x$  values make  $f(x) = 0$ ?
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11. Find the domain of  $f(x) = 7\sqrt{5x + 10}$ .

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12. Find the domain of  $f(x) = \frac{1}{x^2 + x - 12}$

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13. Let

$$f(x) = \begin{cases} \frac{3}{x-1}, & x \leq 2, \\ 4, & x > 2. \end{cases}$$

What is the domain of  $f$ ?

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14. Draw a graph with an absolute maximum, but no absolute minimum, which does have a relative minimum.

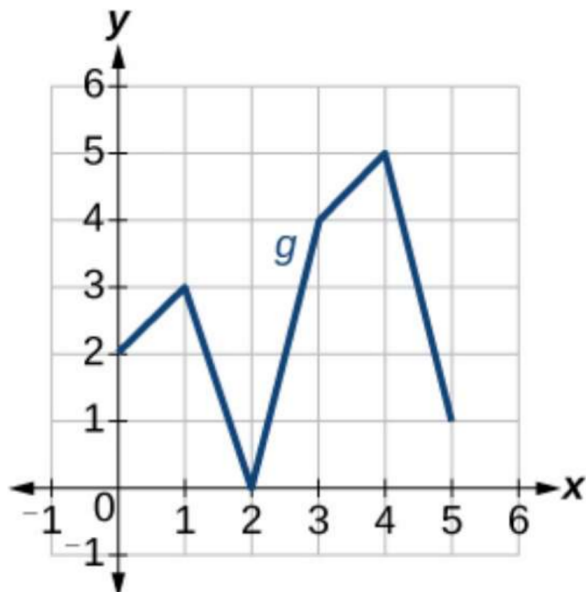
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15. What are the absolute extrema of the graph of  $y = x^2 + 1$ ?

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16. Consider the function graphed below.

- (a) Find the intervals where it increases.
- (b) Find the intervals where it decreases.
- (c) Find all local maxima (both  $x$  and  $y$  coordinates).
- (d) Find all local minima (both  $x$  and  $y$  coordinates).



17. Let  $f(x) = \frac{1}{x^3}$  and  $g(x) = \sqrt{x+1}$ . Find the domain of each of the following.

(a)  $(f + g)$

(c)  $(f * g)$

(b)  $(f - g)$

(d)  $\left(\frac{f}{g}\right)$

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18. Let  $f(x) = 2x$  and  $g(x) = x + 10$ .

(a) Find  $(f \circ g)(5)$

(c) Find  $f(f(5))$

(b) Find  $g(f(5))$

(d) Find  $(g \circ g)(5)$

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19. Let  $f(x) = x^2 + x - 2$  and  $g(x) = \frac{x}{x^2 + 3}$ . Find (and simplify) the following.

(a)  $f(g(x))$

(b)  $g(f(x))$

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20. Let  $H(x) = \frac{1}{(2x+1)^2}$ . Find functions  $f$  and  $g$  so that  $H = f \circ g$ .

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21. For  $f(x) = \sqrt{x}$  and  $g(x) = x^2$ , write the domain of  $f \circ g$  in interval notation. Also, find the domain of  $g \circ f$ .

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22. How does  $f(x + 21) - 8$  transform the graph of  $f(x)$ ?

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23. Write a formula for the function obtained when the graph of  $f(x) = x^3$  is shifted up 1 unit and to the left 2 units.

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24. How does  $g(25x)$  transform the graph of  $g(x)$ ?

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25. How does  $g(25x)$  transform the graph of  $g(x)$ ?

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26. Consider  $h(x) = 2^{x-2} - 2$ . On one axis graph the basic function it is transformed from. Then on another axis, graph  $h(x)$  using graph transformations.

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