HW #1

Kerry Ojakian's MTH 30 Class

Due Date: Thursday September 18

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 $f(x) = \begin{cases} x & if\ x < -2 \\ 2x - 1 & if\ -2 \le x \le 3 \\ -4x & if\ x > 3 \end{cases}$

   Find the following values.

   (a) $f(-5) =$

   (b) $f(-2) =$

   (c) $f(0) =$

   (d) $f(3) =$

   (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 $f(17)$

   (b) Evaluate $f(2)$

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

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

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

    (a) $f(2) =$

    (b) $f(-1) =$

    (c) $f(r) =$

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

    (e) $f(-x) =$

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

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

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

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

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

9. **Solve the inequality and graph its solution.**
$-8 - 7x > -1$

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

    (a) Evaluate $f(0)$.

    (b) When is the function undefined?

    (c) What is the domain of the function?

    (d) Which x values make $f(x) = 0$?

11. Find the domain of $f(x) = 7\sqrt{5x + 10}$.

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

13. Let
$$f(x) = \begin{cases} \dfrac{3}{x - 1}, & x \le 2, \\ 4, & x > 2. \end{cases}$$

What is the domain of f?

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

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).

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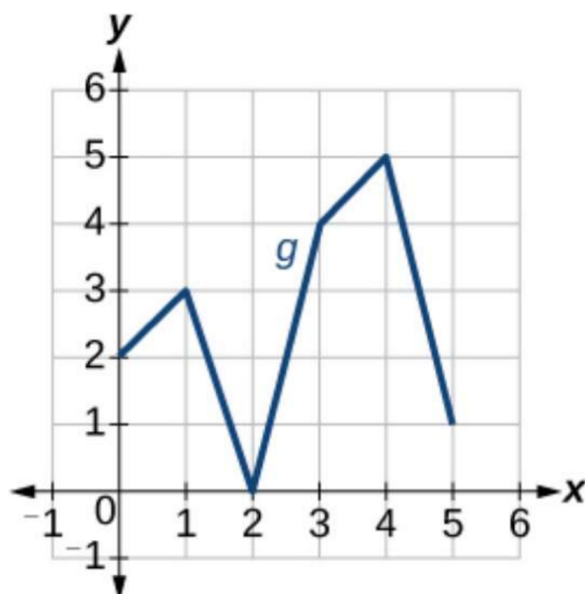
17. Let $f(x) = \dfrac{1}{x^3}$ and $g(x) = \sqrt{x+1}$. Find the domain of each of the following.

    (a) $(f+g)$ (c) $(f * g)$

    (b) $(f-g)$ (d) $\left(\dfrac{f}{g}\right)$

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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 $g(x) = \dfrac{x}{x^2+3}$. Find (and simplify) the following.

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

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20. Let $H(x) = \dfrac{1}{(2x+1)^2}$. 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 $f(x)$?

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.

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

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

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.