

HW #1

Kerry Ojakian's MTH 30 Class

Due Date: Tuesday Feb 24

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) $f(x^3) =$

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

- (a) Evaluate $f(0)$.
- (b) When is the function undefined?
- (c) What is the domain of the function?
- (d) Which x values make $f(x) = 0$?

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

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

13. Let

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

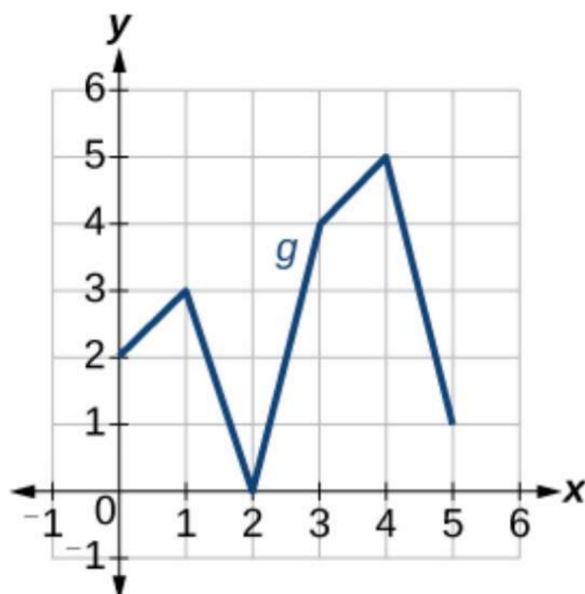
What is the domain of f ?

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 $y = x^2 + 1$?

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

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 $(g \circ g)(5)$

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) $g(f(x))$

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

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 $g \circ f$.

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. 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.
