

1 Week 12 HOGU: Sections 5.1 - 5.6

Problem 1. Let $g(x) = 4 - x - x^2$. Compute and simplify the following:

(a) $g(2)$

(b) $g(-a)$

(c) $g(1) - g(-1)$

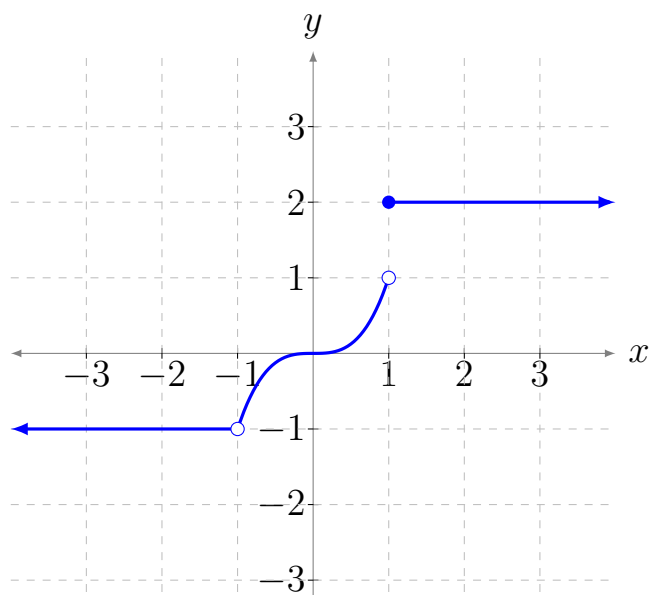
For reference, here is $g(x)$: $g(x) = 4 - x - x^2$.

(d) $g(x + h)$

(e) $g(x + h) - g(x)$

(f) $\frac{g(x + h) - g(x)}{h}$

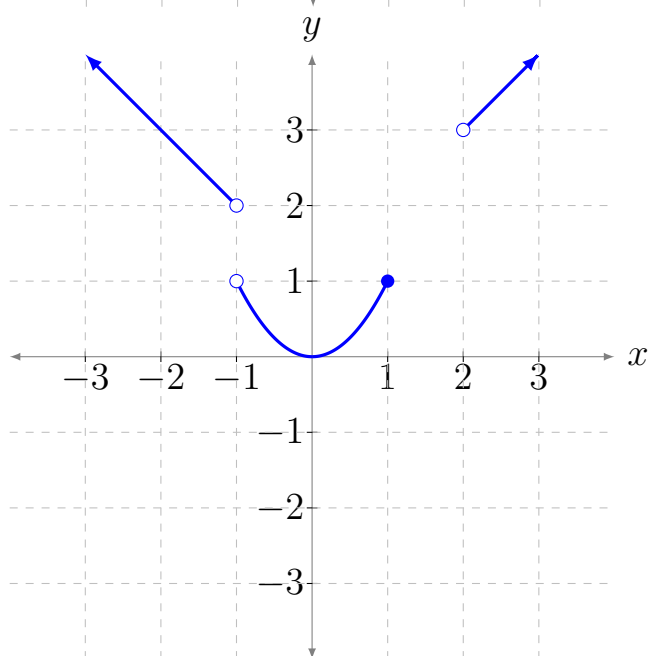
Problem 2. The graphs of some relations are given below. If the relation is *not a function*, simply state “not a function” and explain why. If the relation *is a function*, find its domain and range.



Is it a function?

Domain:

Range:



Is it a function?

Domain:

Range:

Problem 3. (a) What is $-(4x)^2$?

(b) What is $(-4x)^2$?

(c) What is $-4(x)^2$?

(d) What is $-4(-x)^2$?

Problem 4. What is the end behavior for the given polynomials?

(a) $t(x) = (x - 1)(x - 3)$

As $x \rightarrow -\infty$, $t(x) \rightarrow$ _____.

As $x \rightarrow \infty$, $t(x) \rightarrow$ _____.

(b) $f(x) = 2x^5 - x^{15}$

Problem 5. Let $p(x) = -5x + 90$ be the price of a bottle of Mama Liz's Chili Oil, where x is the number of jars of chili oil that Mama Liz sells. If the cost to Mama Liz to make x jars of chili oil is given by the function $C(x) = 20x + 120$, and Mama Liz sells all the jars she makes, find the following:

(a) the number of jars sold when revenue is maximized

(b) the maximum revenue that Mama Liz can make from selling chili oil

(c) the maximum profit that Mama Liz makes from selling chili oil

Problem 6. Completely simplify each of the following expressions, assuming all variables are positive.

(a) $(x^2 + 4y^3) \cdot (5x - 2y^3)$

(b) $\left(\frac{2(3rt^5)^2}{9r^4t}\right)^3$

Problem 7. Compute and completely simplify the difference quotient for the function $g(x) = -\frac{3}{x+1}$.

(a) $g(x+h) =$

(b) $g(x+h) - g(x) =$

(c) $\frac{g(x+h) - g(x)}{h} =$

Problem 8. State the values for the given function:

$$f(x) = \begin{cases} \frac{1}{\sqrt{-4-x}} & \text{if } x \leq -3 \\ x^2 - 4 & \text{if } -3 < x < 5 \\ \frac{8}{x-6} & \text{if } 5 < x < 7 \end{cases}$$

(a) $f(-5)$

(b) $f(-3)$

(c) $f(1)$

(d) $f(5)$

(e) $f(6)$

(f) What is the domain of this function?

Problem 9. Write the equivalent piecewise-defined function for

$$k(x) = |2x - 1|.$$

Problem 10. You buy a cell phone plan that includes 1 gigabyte (GB) of free data per month. After you use 1 GB, the phone plan charges \$5 for each additional gigabyte used in the month up to 10 GB. After you use 10 GB, the phone plan then charges \$20 for each additional gigabyte used in the month.

Write the function $C(x)$, representing the cost, C , for x gigabytes of data used on this phone plan in a month.

Problem 11. Using the Law of Exponents, rewrite

$$3 \cdot 9^{x^2}$$

as an expression in base 3.

Problem 12. Using the Law of Exponents, rewrite

$$\left(\frac{1}{64}\right)^{4-6x}$$

as an expression in base 2.