

Lesson 13: Evaluating Functions

CC attribute: *Beginning and Intermediate Algebra* by T. Wallace.



Objective: Evaluate functions using appropriate notation.

Students will be able to:

- Evaluate a function by substituting a given value as an input and simplifying.

Prerequisite Knowledge:

- Order of operations.

Lesson:

A function-related skill we will want to quickly master is evaluating functions at certain values of the independent variable (usually x). This is accomplished by substituting the specified value into the function for x and simplifying the resulting expression to find $f(x)$.

I - Motivating Example(s):

Example: Find $f(-2)$, where $f(x) = 3x^2 - 4x$.

$f(x) = 3x^2 - 4x$	Evaluate; Substitute -2 for each x
$f(-2) = 3(-2)^2 - 4(-2)$	Simplify using order of operations; exponent first
$f(-2) = 3(4) - 4(-2)$	Multiply and add
$f(-2) = 20$	Our solution

II - Demo/Discussion Problems:

1. Find $h(4)$, where $h(x) = 3^{2x-6}$.
2. Find $k(-7)$, where $k(a) = 2|a + 4|$.
3. Find $p(t + 1)$, where $p(t) = t^2 - t$.

III - Practice Problems:

Find $f(0)$ for each of the given functions.

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|------------------------------|---------------------------|--|
| 1. $f(x) = 2x - 1$ | 4. $f(x) = x^2 - x - 12$ | 7. $f(x) = \frac{3}{4 - x}$ |
| 2. $f(x) = 3 - \frac{2x}{5}$ | 5. $f(x) = \sqrt{x + 4}$ | 8. $f(x) = \frac{3x^2 - 12x}{4 - x^2}$ |
| 3. $f(x) = 2x^2 - 6$ | 6. $f(x) = \sqrt{1 - 2x}$ | |

Use the functions listed below to evaluate each of the following.

- $f(x) = -4x^2$

- $k(x) = 2x^3 + |x - 1|$

- $g(x) = x - 9$

- $m(a) = 3a^2$

9. $f(-2)$

11. $k(-2)$

13. $f(a + 2)$

15. $k(2)$

10. $g(7)$

12. $m(-2)$

14. $g(2y)$

16. $m(a - 2)$

For each problem, use the given function f to find and simplify each of the **nine** related values/expressions listed below.

- $f(1)$

- $f(-3)$

- $f\left(\frac{3}{2}\right)$

- $f(4x)$

- $4f(x)$

- $f(-x)$

- $f(x - 4)$

- $f(x) - 4$

- $f(x^2)$

17. $f(x) = 2x + 1$

20. $f(x) = x^2 - 3x + 2$

23. $f(x) = 6$

18. $f(x) = 3 - 4x$

21. $f(x) = \sqrt{x - 1}$

24. $f(x) = 0$

19. $f(x) = 2 - x^2$

22. $f(x) = \frac{x}{x - 1}$

For each problem, use the given function f to find and simplify each of the **nine** related values/expressions listed below.

- $f(2)$

- $f(-2)$

- $f(2a)$

- $2f(a)$

- $f(a + 2)$

- $f(a) + f(2)$

- $f\left(\frac{2}{a}\right)$

- $\frac{f(a)}{2}$

- $f(a + h)$

25. $f(x) = 2x - 5$

28. $f(x) = 3x^2 + 3x - 2$

31. $f(x) = \frac{x}{2}$

26. $f(x) = 5 - 2x$

29. $f(x) = \sqrt{2x + 1}$

27. $f(x) = 2x^2 - 1$

30. $f(x) = 1$

32. $f(x) = \frac{2}{x}$