

4.6 Homework: Graphing linear equations

1. Step by step: Given $f(x) = 3x + 2$. What is $f(2x - 1)$?
 - (a) Perform the substitution, putting $2x - 1$ in parenthesis.
 - (b) Simplify, beginning each line with a leading equals sign if it is equal to the line above.
2. Given $f(x) = x^2 - 1$. Simplify $f(2x - 1)$
3. Given $f(x) = x^3$. Simplify $f(x + 1)$
4. Given $f(x) = 4 - (2x^2 + x)$. Simplify $f(\frac{1}{2}x - 3)$

Function composition

5. Step by step: Given $f(x) = x^2 + 2$ and $g(x) = x^2$. What is $(f \circ g)(x)$?
 - (a) Rewrite $f \circ g$ and perform the inner substitution (i.e. for g): $f(g(x)) = f(x^2)$
 - (b) Perform the substitution, putting x^2 in parenthesis (and using a leading equals sign).
 - (c) Simplify, beginning each line with a leading equals sign.

In the following exercises, perform the composition $f \circ g$ and simplify.

6. Given $f(x) = \frac{1}{2}x^2 + 1$ and $g(x) = 2x$
7. Given $f(x) = \sqrt{x - 4}$ and $g(x) = x^2 + 4$
8. Given $f(x) = \frac{1 - x}{x^2} + 1$ and $g(x) = 2x + 3$

Function operations practice

9. Given $f(x) = \frac{1}{2}x^2 - 2$ and $g(x) = x + 2$
 - (a) Find $f + g$
 - (b) Find $f \times g$
 - (c) Find $f \div g$

The inverse of a function

10. Given $f(x) = 3x + 2$. What is the inverse of the function $f^{-1}(x)$?

(a) Rewrite the function reversing x and y . (assume that y and $f(x)$ are interchangeable)

(b) Solve for x . Finish by putting y on the left side of the equality.

(c) State the answer as $f^{-1}(x)$ equals an expression.

Derive the inverse of each function. Simplify the expression.

11. $f(x) = \frac{1}{2}x + 2$

12. $f(x) = \frac{2}{3}x^2 - 3$

13. $f(x) = \sqrt{x-1} + \frac{1}{2}$