Calculating the inverse of a function algebraically

Given a function $f(x)$, the inverse function is written as $f^{-1}(x)$.

Calculating $f^{-1}(x)$ is a four step process:

1. Set $y = f(x)$
2. Switch the x's and y's
3. Solve for y (Get y on one side of the $=$ sign, and everything else on the other.)
4. Set $f^{-1}(x) = y$

Examples

$$f(x) = 3x - 7$$

1. $y = 3x - 7$
2. $x = 3y - 7$
3. $3y = x + 7 \rightarrow y = \frac{x+7}{3}$
4. $f^{-1}(x) = \frac{x+7}{3}$

$$f(x) = \frac{4x}{3} + 8$$

1. $y = \frac{4x}{3} + 8$
2. $x = \frac{4y}{3} + 8$
3. $\frac{4y}{3} = x - 8 \rightarrow y = \frac{3(x-8)}{4}$
4. $f^{-1}(x) = \frac{3x-24}{4}$

$$f(x) = x^2 - 3$$

1. $y = x^2 - 3$
2. $x = y^2 - 3$
3. $y^2 = x+3 \rightarrow y = \pm\sqrt{x+3}$
4. $f^{-1}(x) = \pm\sqrt{x+3}$

Practice

$f(x) = 4x + 5$

1.

2.

3.

4. $f^{-1}(x) =$

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

1.

2.

3.

4. $f^{-1}(x) =$

To be handed in:

For each of the following functions, calculate the inverse function:

1. $f(x) = 2x - 7$

2. $f(x) = 3x + 4$

3. $f(x) = 12x - 42$

4. $f(x) = 99x - 101$

5. $f(x) = \frac{2x}{3} + 2$

6. $f(x) = -\frac{x}{5} + 1$

7. $f(x) = \frac{6x}{7} - 8$

8. $f(x) = -\frac{3x}{5} - 12$

9. $f(x) = x^2 + 9$

10. $f(x) = x^2 - 3$

11. $f(x) = 4x^2 + 2$

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