

Inverse Functions with Completing the Square

Find the inverse function $f^{-1}(x)$ for each of the following functions:

- (a) $f(x) = (x - 2)^2 + 5$ for $x \geq 2$
- (b) $f(x) = (x + 3)^2 - 1$ for $x \leq -3$
- (c) $f(x) = 2(x - 1)^2 + 3$ for $x \leq 1$
- (d) $f(x) = 4(x + 2)^2 - 7$ for $x \geq -2$

Find the inverse function $f^{-1}(x)$ for each of the following functions:

- (a) $f(x) = x^2 + 6x$ for $x \geq -3$
- (b) $f(x) = x^2 - 10x + 3$ for $x \leq 5$
- (c) $f(x) = x^2 + 2x - 5$ for $x \leq -1$
- (d) $f(x) = x^2 - 8x + 1$ for $x \geq 4$

Find the inverse function $f^{-1}(x)$ for each of the following functions:

- (a) $f(x) = 2x^2 - 8x$ for $x \geq 2$
- (b) $f(x) = 3x^2 - 6x + 1$ for $x \leq 1$
- (c) $f(x) = 4x^2 + 24x - 3$ for $x \geq -3$
- (d) $f(x) = 2x^2 - 10x + 3$ for $x \leq 2.5$

The function $g(x)$ is defined as $g(x) = x^2 - 6x + 3$ where $x \geq 3$

- (a) Find the inverse function $g^{-1}(x)$ in the form $g^{-1}(x) = ..$
- (b) Solve $g^{-1}(x) = 5$

The function $f(x)$ is defined as $f(x) = 3x^2 + 12x - 2$ where $x \leq -2$

- (a) Find the inverse function $f^{-1}(x)$ in the form $f^{-1}(x) = ..$
- (b) Solve $f^{-1}(x) = -3$

$$(a) f^{-1}(x) = 2 + \sqrt{x-5}$$

$$(b) f^{-1}(x) = -3 - \sqrt{x+1}$$

$$(c) f^{-1}(x) = 1 - \sqrt{\frac{x-3}{2}}$$

$$(d) f^{-1}(x) = -2 + \sqrt{\frac{y+7}{4}}$$

$$(a) f^{-1}(x) = -3 + \sqrt{x+9}$$

$$(b) f^{-1}(x) = 5 - \sqrt{x+22}$$

$$(c) f^{-1}(x) = 1 - \sqrt{x+6}$$

$$(d) f^{-1}(x) = 4 + \sqrt{x+15}$$

$$(a) f^{-1}(x) = 2 + \sqrt{\frac{x+8}{2}}$$

$$(b) f^{-1}(x) = 1 - \sqrt{\frac{x+2}{3}}$$

$$(c) f^{-1}(x) = -3 + \sqrt{\frac{x+39}{4}}$$

$$(d) f^{-1}(x) = \frac{5}{2} - \sqrt{\frac{2x+19}{4}}$$

$$(a) f^{-1}(x) = 3 + \sqrt{x+6}$$

$$(b) 3 + \sqrt{x+6} = 5$$

$$x = -2$$

$$(a) f^{-1}(x) = -2 - \sqrt{\frac{x+14}{3}}$$

$$(b) -2 - \sqrt{\frac{x+14}{3}} = -3$$

$$x = -11$$