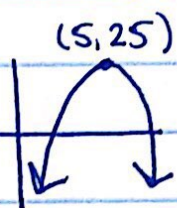


Extra Inverse Examples

$$\begin{aligned} 1) \quad y &= -x^2 + 10x \\ y &= -(x^2 - 10x + 25) - (-25) \\ y &= -(x-5)^2 + 25 \end{aligned}$$

Vertex: $(5, 25)$



Restricted Domain: $[5, +\infty)$

Range: $(-\infty, 25]$

$$\begin{aligned} x &= -(y-5)^2 + 25 \\ (x-25) &= -(y-5)^2 \\ -x+25 &= (y-5)^2 \\ \sqrt{-x+25} &= y-5 \\ \sqrt{-x+25} + 5 &= y \end{aligned}$$

$$f^{-1}(x) = \sqrt{-x+25} + 5$$

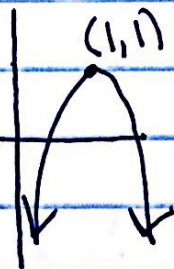
Domain: $(-\infty, 25]$

Range: $[5, +\infty)$

$$2) f(x) = -3x^2 + 6x - 2$$

$$f(x) = -3(x^2 - 2x + 1) - 2 - (-3)(1)$$

$$f(x) = -3(x-1)^2 + 1$$



Restricted Domain: $[1, +\infty)$

Range: $(-\infty, 1]$

$$x = -3(y-1)^2 + 1$$

$$(x-1) = -3(y-1)^2$$

$$-\frac{1}{3}(x-1) = (y-1)^2$$

$$\sqrt{-\frac{1}{3}(x-1)} = y-1$$

$$\sqrt{-\frac{1}{3}(x-1)} + 1 = y$$

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

Domain: $(-\infty, 1]$

Range: $[1, +\infty)$

$$3) \quad y = \frac{x+6}{x-3} \quad \text{Domain: } (-\infty, 3) \cup (3, +\infty)$$

$$\text{Range: } (-\infty, 1) \cup (1, +\infty)$$

$$\text{VA: } x=3$$

$$\text{HA: } y=1$$

$$x = \frac{y+6}{y-3}$$

Domain: The range of $f(x)$
minus any new restrictions

$$x(y-3) = y+6$$

$$xy - 3x = y+6$$

$$xy - y = 3x+6$$

$$y(x-1) = 3x+6$$

$$y = \frac{3x+6}{x-1}$$

$$\text{Domain: } (-\infty, 1) \cup (1, +\infty)$$

$$y^{-1} = \frac{3x+6}{x-1}$$

$$4) \quad y = \frac{2x+7}{x-3}$$

$$\text{Domain: } (-\infty, 3) \cup (3, +\infty)$$

$$\text{Range: } (-\infty, 2) \cup (2, +\infty)$$

$$\text{VA: } x=3$$

$$\text{HA: } x=2$$

$$x = \frac{2y+7}{y-3}$$

$$x(y-3) = 2y+7$$

$$xy - 3x = 2y+7$$

$$xy - 2y = 3x+7$$

$$y(x-2) = 3x+7 \quad y^{-1} = \frac{3x+7}{x-2}$$

$$y = \frac{3x+7}{x-2}$$

$$x-2$$

$$\uparrow$$

$$x \neq 2$$

Domain:

$$(-\infty, 2) \cup (2, +\infty)$$