

Inverse of a function

Sunday, November 10, 2013
8:22 AM

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

$$f(3) = 2 \times 3^2 = 2 \times 9 = 18$$

input output

$$f^{-1}(18) = 3$$

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

$$y = 2x^2$$

$$\frac{y}{2} = x^2$$

$$\sqrt{\frac{y}{2}} = \sqrt{x^2}$$

$$\sqrt{\frac{y}{2}} = x$$

$$f^{-1}(y) = \sqrt{\frac{y}{2}}$$

$$\begin{aligned} f^{-1}(18) &= \sqrt{\frac{18}{2}} \\ &= \sqrt{9} \\ &= \pm 3 \end{aligned}$$

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

$$f(3) = 2 \times 3^2 = 2 \times 9 = 18$$

$$\begin{aligned} f(-3) &= 2 \times (-3)^2 \\ &= 2 \times 9 = 18 \end{aligned}$$

Find the inverse of $f(x) = (x-1)^2$

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

$$\sqrt{y} = x-1$$

$$\sqrt{y} + 1 = x$$

$$f^{-1}(y) = \sqrt{y} + 1$$

$$\text{let } x = 5 \quad f(x) = (5-1)^2 = 4^2 = 16 = y$$

$$\text{let } y = 16 \quad f^{-1}(16) = \sqrt{16} + 1$$

$$\begin{aligned} &= 4 + 1 \quad \text{or} \quad -4 + 1 \\ &= 5 \quad \quad \quad = -3 \end{aligned}$$

$$\begin{aligned} f(x) &= (x-1)^2 \\ f(-3) &= (-3-1)^2 \\ &= (-4)^2 \\ &= 16 \end{aligned}$$