

Graph the Given Function and its inverse.  $f(x)$

2.  $y = x^2 - 6x + 9$

**Solution:**

Alternative form of the equation:

$$x^2 - 6x + 9 = (x - 3)^2$$

From the equation we can see that the curve crosses the x-axis at one point ( $y = 0$ ):

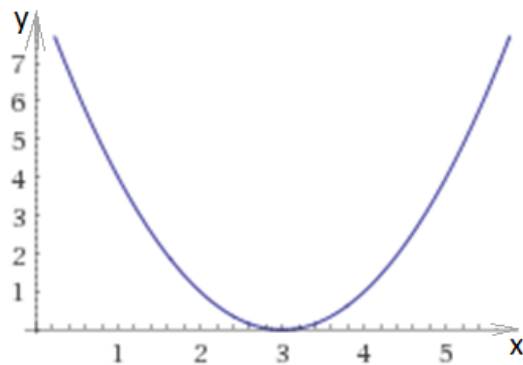
$$x = 3; y = 0$$

X-coordinate of the vertex of the parabola:

$$x_{ver} = -\frac{b}{2a} = \frac{6}{2} = 3$$

$$y_{ver} = 3^2 - 6 * 3 + 9 = 0$$

Now we can build a graph - standard parabola with vertex in point (3,0)



**Inverse function**

We can simply rewrite the equation as:

$$y = x^2 - 6x + 9$$

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

$$\sqrt{y} = 3 - x$$

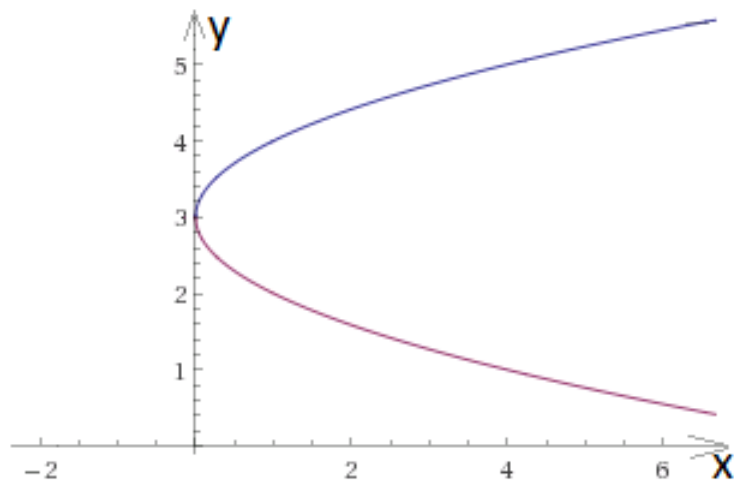
Inverse function (change the X to Y and Y to X,  $x \rightarrow y, y \rightarrow x$ ):

$$\sqrt{x} = 3 - y$$

$$y = 3 - \sqrt{x}$$

when we take the square root, we ignored the sign, which means the inverse function is symmetric about the line  $y=3$ :

$$y = 3 \pm \sqrt{x}$$



Another way to graph an inverse function – we need just to reflect the parabola about the line  $y=x$ , so in this way we change the X and Y-sites:

