

How do you graph and tell if this equation is linear or not  $y = -x^2 + 1$

**Solution:**

This is not a linear equation, because it is a polynomial equation of the second degree. So it is a quadratic equation and graph of this function is a parabola.

First find where the function intercepts the x-axis by setting  $y = 0$ .

$$-x^2 + 1 = 0$$

$$x^2 = 1$$

$$x = \pm 1$$

So we now have the x-intercepts  $(1,0)$  and  $(-1,0)$

Next, the vertex of a parabola is  $-b/2a$ , when the function is in form  $ax^2 + bx + c$ . So, for our purposes the vertex is

$$x_v = -\frac{0}{-2} = 0$$

$$y_v = -0 + 1 = 1$$

So the vertex is  $(0,1)$ .

Note the direction in which the function opens: the leading coefficient is  $-1$  (of  $x^2$ ). This means it opens downward.

Now we can graph it properly.

