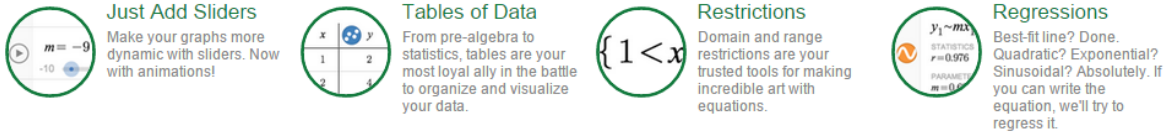
USING DESMOS

Desmos is a free online interactive graphing calculator program that can be used to carry out many of the same calculations and operations that can be performed with a graphing calculator, and more: graph a function (including piecewise-defined functions), make a table of values for a function, fit a line to a data set, and make a dynamic graph with a slider. The web address for Desmos is

www.desmos.com

On the home page, you can explore on your own by choosing from many examples.



Below, examples of the following are given.

Example 1: Graph a Function

Example 2: Graph a Piecewise-defined Function

Example 3: Make a Table of Values for a Function Formula

Example 4: Create an Interactive Graph with a Slider

Example 1: GRAPH A FUNCTION

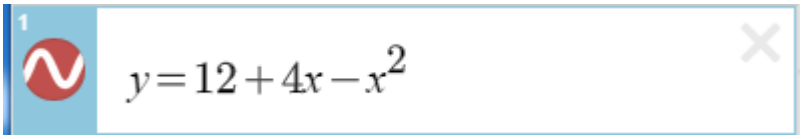
Graph the quadratic function

$$y = 12 + 4x - x^2$$

in the graphing window [-4, 8] by [-2, 16].
Function formulas are entered on the far left-side of the Desmos window in the boxes numbered 1, 2, etc. For the given function, enter the following into box 1.

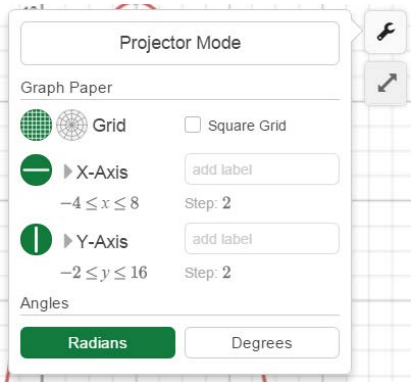
y = 12+4x-x^2

On the screen, you will see the following in box 1.

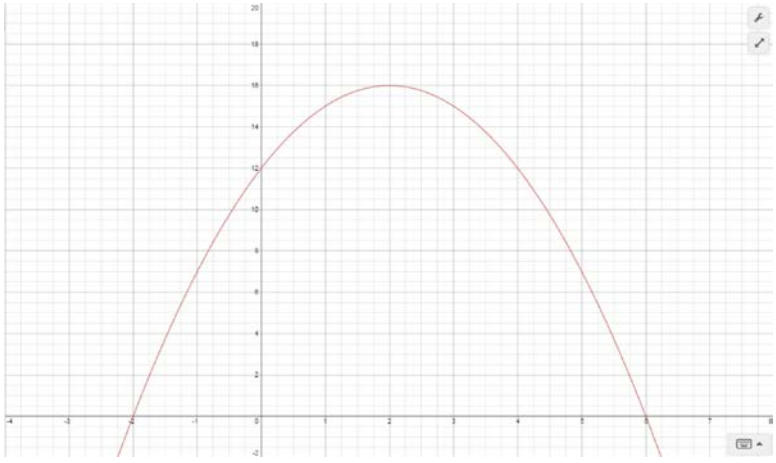


(Note: x^2 displays as x^2.)
The graphing window may be changed by clicking on the "wrench icon" in the far upper right hand side of the screen.

Just click on the numbers shown for the X-axis or Y-axis to change their values. Then click outside of the box to close the graph settings window.



The resulting graph is shown in the following figure.



Example 2: GRAPH A PIECEWISE-DEFINED FUNCTION

Graph the piecewise-defined function.

$$f(x) = \begin{cases} x^2 & \text{if } x \le 1 \\ 1 - x & \text{if } x > 1 \end{cases}$$

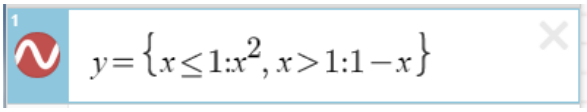
The template for a piecewise-defined function with three rules is as follows.

y = { first domain: first rule, second domain: second rule, third domain: third rule }

For the given function, enter the following into box 1.

y = {1<=x: x^2, x>1: 1-x}

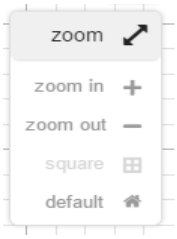
On the screen, you will see the following in box 1.
(Note: 1<=x displays as x≤1and x^2 displays as x^2.)



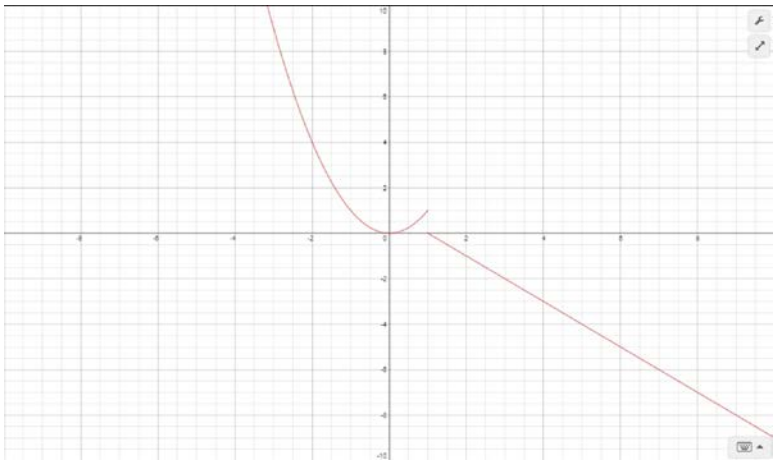
The graphing window may be changed by clicking on the "wrench icon" in the far upper right hand side of the screen.

Just click on the numbers shown for the X-axis or Y-axis to change their values.

You can also zoom-in or zoom-out on the graph by clicking on the "2-sided line icon" in the far upper right hand side of the screen.



The following figure shows the resulting graph in the window [-5, 5] by [-10, 10].



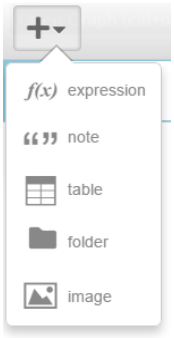
Example 3: Make a Table of Values for a Function Formula

Make a table of values for

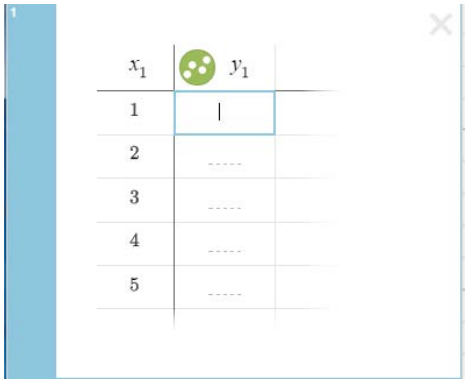
$$y = x^2$$

for the values x = 1, 1.5, 2, 2.5 and 3.

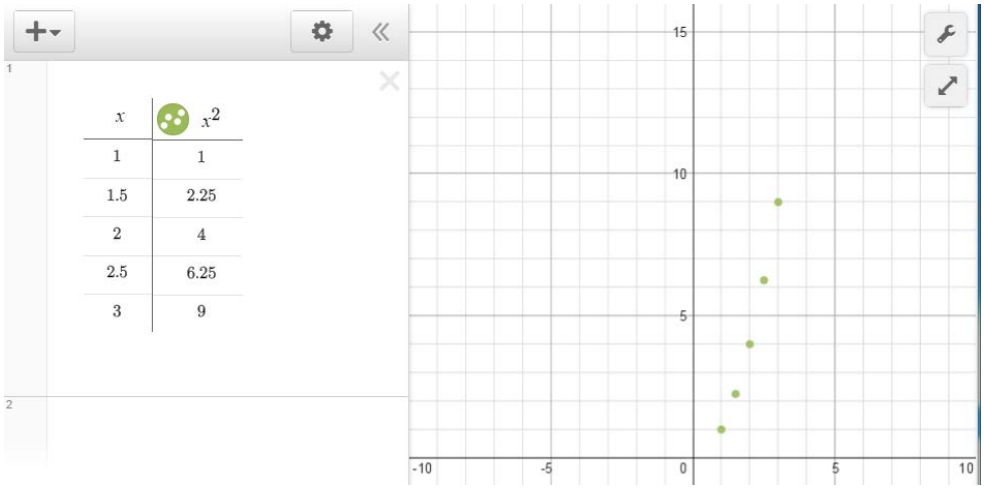
First, click on the + button (Add Item) on the left side of the Desmos window and a drop down menu will appear.



Select the table option from this menu – the following figure will appear in box 1.



Replace x_1 by x by just highlighting x_1 with the mouse cursor and typing over it. Similarly, replace "y_1" by "x^2", and change the x-values as needed. The following figure will appear on the screen.



Observe that the polka-dot circle next to "x^2" is a toggle switch for the matching scatter plot in the graphing window.

Example 4: Create an Interactive Graph with a Slider

Create an interactive graph for

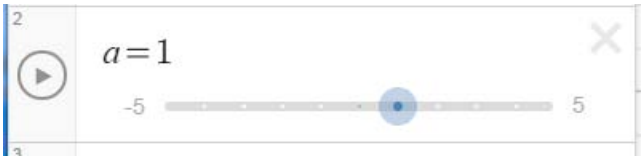
$$y = ax$$

for the values a = -5, -4, …, 4, 5 in the graphing window [-10,10] by [-10,10].
First, enter the function formula in box 1.

Next, click on the button labeled with "*a*" in box 1. The following appears in box 2.

You can change the values of a on the slider by just clicking on the number -10 on the slider.

For this example, the values of a range from -5 to 5 with a step of 1 since the x-values constantly increase by 1. Then click outside of the box to fix these values.



Finally, you just click on the forward play button  to start the animation – don't forget about the graphing window if it needs adjusting. To stop the animation, click on the stop button  .