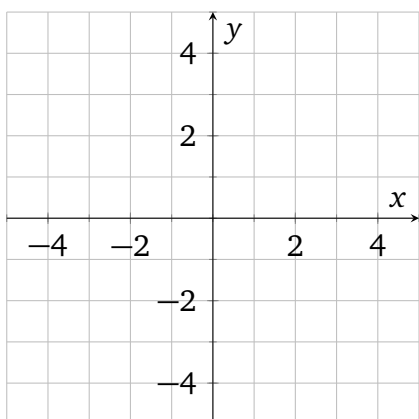


Piecewise-Defined Functions

In these exercises, we will practice plotting a piecewise-defined function. We will also practice reading the graph of a piecewise-defined function.

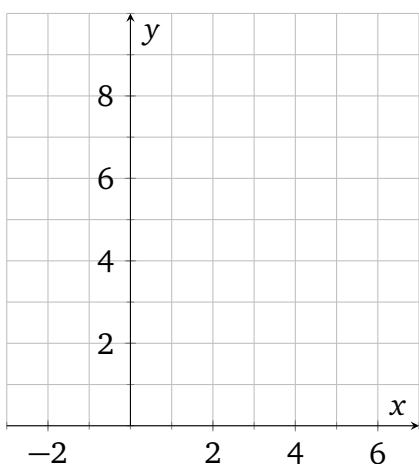
- Graph the piecewise defined function by hand. If it helps, plot points first. Use arrows to indicate if a graph extends of the grid in some way. Use solid and hollow dots to indicate special behavior of the function where there is a transition from one rule to another rule.



$$f(x) = \begin{cases} x + 4, & x \leq -2 \\ 2, & -2 < x < 2 \\ 4 - x, & x \geq 2 \end{cases}$$

What is the domain and range of f ?

- Graph the piecewise defined function by hand. If it helps, plot points first. Use arrows to indicate if a graph extends of the grid in some way. Use solid and hollow dots to indicate special behavior of the function where there is a transition from one rule to another rule.



$$f(x) = \begin{cases} \frac{1}{2}x^2 + 3, & -2 < x \leq 0 \\ \sqrt{x}, & 0 < x < 4 \\ 4(x - 4) + 2, & x \geq 4 \end{cases}$$

What is the domain and range of f ?

- Consider the function f defined by $f(x) = \begin{cases} x + 1, & x < 1 \\ 3 - x^2 & x \geq 1 \end{cases}$. What is the domain of this function and what is its range?

4. Use your calculator to graph $f(x) = \begin{cases} x + 1, & x < 1 \\ 3 - x^2 & x \geq 1 \end{cases}$.

TI-89: In the Y= menu, enter:

Y1 = when($x < 1, x + 1,$
 $\text{when}(x \geq 1, 3 - x^2,$
 $1/0))$

You can either type “when” directly or use the CATALOG. Use the Math→Test menu to get the symbols $<$ and $\geq$.

TI-83/84: In the Y= menu, enter:

Y1 = ($x + 1$) * ($x < 1$)
 $+ (3 - x^2) * (x \geq 1)$

Use the Math→Test menu to get the symbols $<$ and $\geq$.

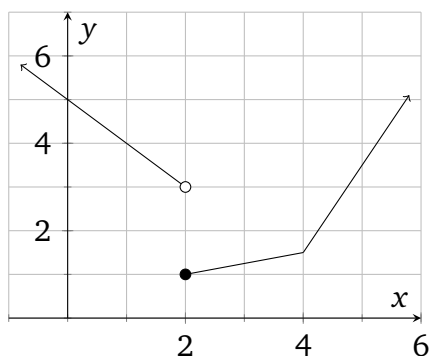
Casio 330: In the Y= screen, enter:

Y1 = $\begin{cases} x + 1, & x < 1 \\ 3 - x^2 & x \geq 1 \end{cases}$

Use the 2D tab and the special button for piecewise-defined functions.

Go to the Graph screen, making sure that you are in a good Window.

5. Find a piecewise defined formula for the function with this graph.



6. A museum charges \$5 per person. However, larger groups get a discount. You may purchase a group ticket for \$40 that lets in up to 12 people. If your group has more than 12 people, each additional person costs \$2 more.

Let n be the number of people in a group that wants to enter the museum. Let C be the entrance cost for the entire group. The cost is a function of how many people are in the group: $C = f(n)$. Plot $f(n)$ for $n = 1$ up to $n = 20$, and give a piecewise defined formula for $f(n)$.

