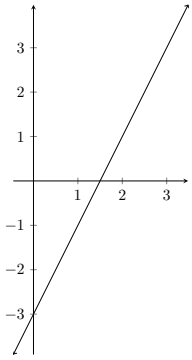
Section 2.2 Notes

Graphs of Functions

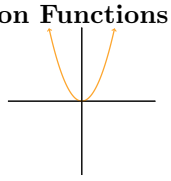
1 "Normal" Non-Piecewise Functions

Process

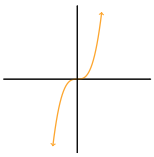
With functions, x is the input and $f(x)$ is the output. To graph, we can treat $f(x)$ just like y. For example, graphing $f(x) = 2x - 3$ is exactly like graphing $y = 2x - 3$:



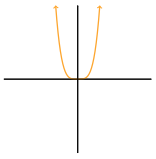
Common Functions



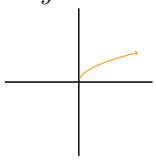
$y = x^2$



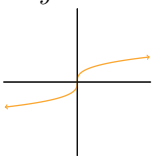
$y = x^3$



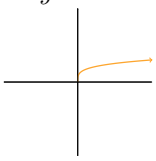
$y = x^4$



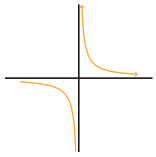
$y = \sqrt{x}$



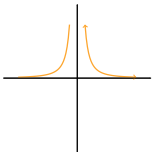
$y = \sqrt[3]{x}$



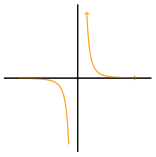
$y = \sqrt[4]{x}$



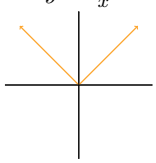
$y = \frac{1}{x}$



$y = \frac{1}{x^2}$



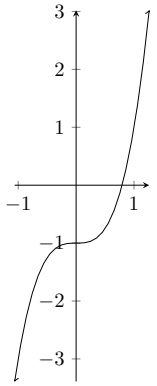
$y = \frac{1}{x^3}$



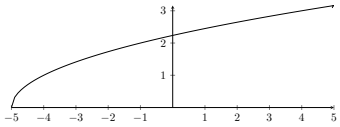
$y = |x|$

Examples

1. Graph $g(x) = 2x^3 - 1$.



2. Graph $f(x) = \sqrt{x+5}$.



2 Piecewise Functions

Process

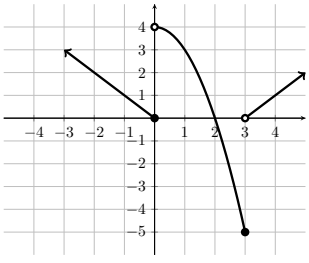
1. Split apart the function into the separate formulas. Determine what the graphs of each of those formulas looks like separately.
2. Use the inequalities to figure out what "section" you need from each graph.
3. Put all the "sections" together on a single graph, making sure to correctly plot the endpoints.
   - $<$ or $>$ - use an open circle
   - $\leq$ or $\geq$ - use a closed circle

   None of the sections should have any vertical overlap! (Otherwise, it fails the vertical line test so what you've drawn isn't a function.)

Examples

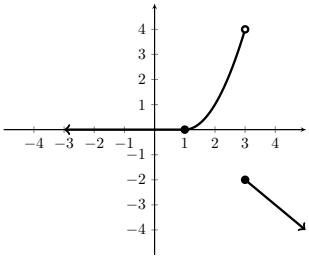
1. Graph

$$f(x) = \begin{cases} -x & \text{if} \quad x \leq 0 \\ 4 - x^2 & \text{if} \quad 0 < x \leq 3 \\ x - 3 & \text{if} \quad x > 3 \end{cases}$$

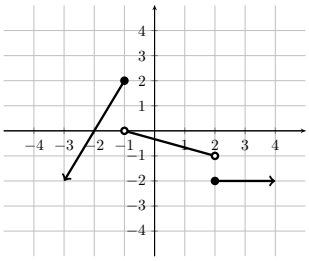


2. Graph

$$f(x) = \begin{cases} 0 & \text{if} \quad x \leq 1 \\ (x-1)^2 & \text{if} \quad 1 < x < 3 \\ -x + 1 & \text{if} \quad x \geq 3 \end{cases}$$



3. Find a formula for the graph shown:



$$f(x) = \begin{cases} 2(x+2) & \text{if} \quad x \leq -1 \\ -\frac{1}{3}(x+1) & \text{if} \quad -1 < x < 2 \\ -2 & \text{if} \quad x \geq 2 \end{cases}$$