Piecewise Functions Practice Problems

Overview: Working with Piecewise Functions

A piecewise function is defined by different formulas for different parts of its domain. Key points to remember:

- Each piece has its own formula and domain interval
- Domain intervals must not overlap
- Use dots to show endpoint behavior:
  - Closed dot (•): endpoint is included (or)
  - Open dot (○): endpoint is excluded (¡ or ¿)
- The domain must cover all cases without gaps

Practice Problems

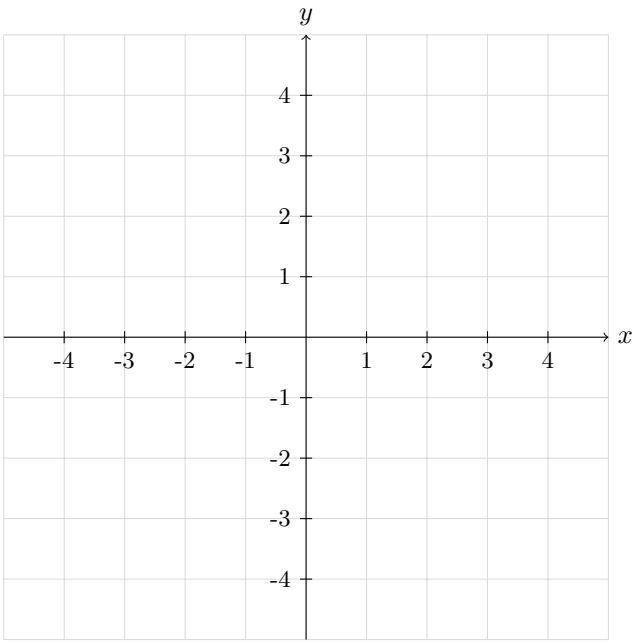
1. Evaluate the following function at the given points:

$$f(x) = \begin{cases} x^2 - 4 & \text{if } x < -1 \\ 2x + 3 & \text{if } -1 \leq x < 2 \\ -x + 6 & \text{if } x \geq 2 \end{cases}$$

Find: $f(-2)$, $f(-1)$, $f(0)$, $f(2)$, $f(3)$

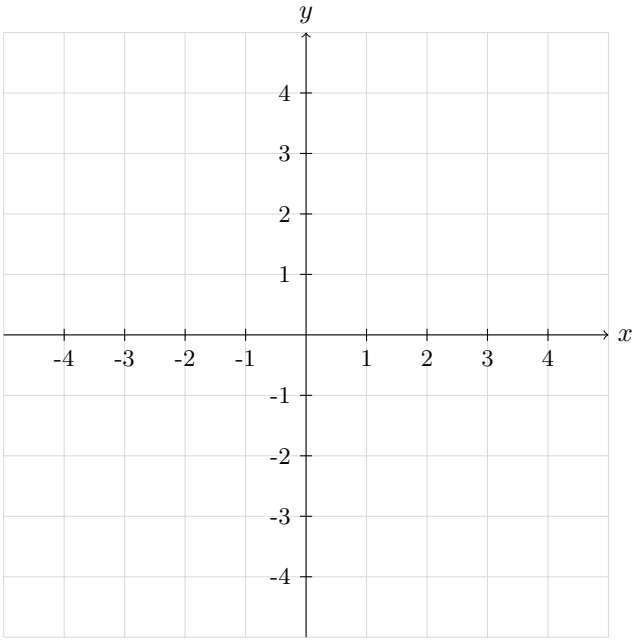
2. Graph the following piecewise function:

$$g(x) = \begin{cases} -2x + 1 & \text{if } x \leq 0 \\ x^2 & \text{if } 0 < x \leq 2 \\ 4 & \text{if } x > 2 \end{cases}$$

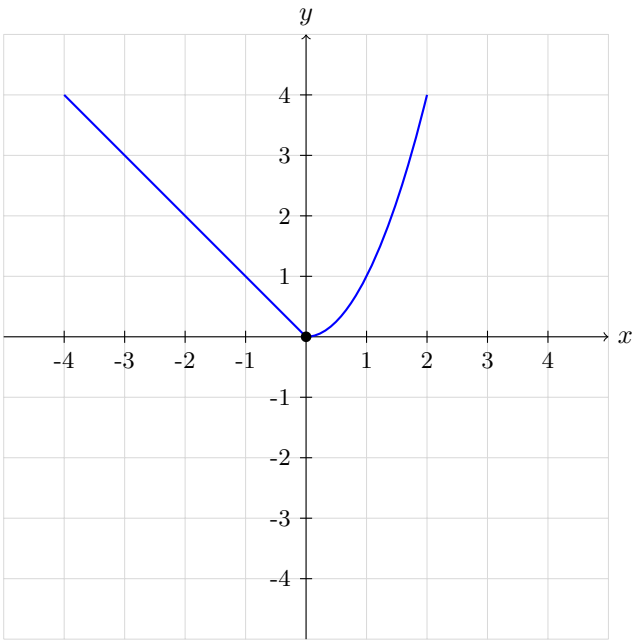


3. Graph the following piecewise function:

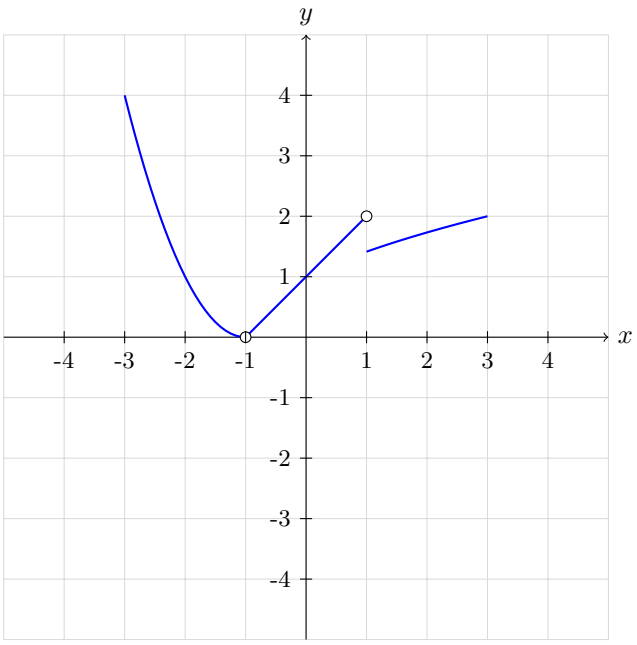
$$h(x) = \begin{cases} |x+1| & \text{if } x < 0 \\ -x+2 & \text{if } 0 \leq x < 2 \\ 0 & \text{if } x \geq 2 \end{cases}$$



4. Write a piecewise function for the graph below:



5. Write a piecewise function for the graph below:

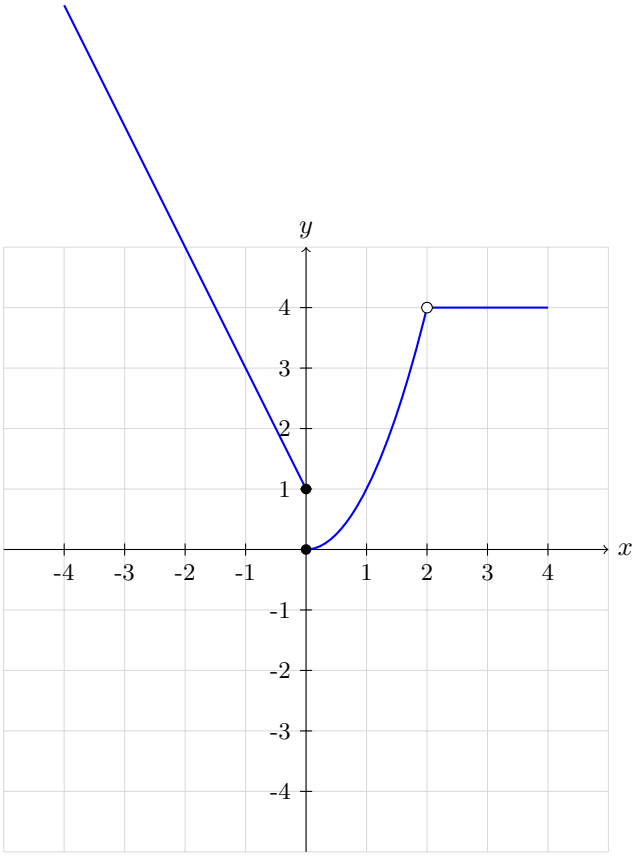


Answer Key

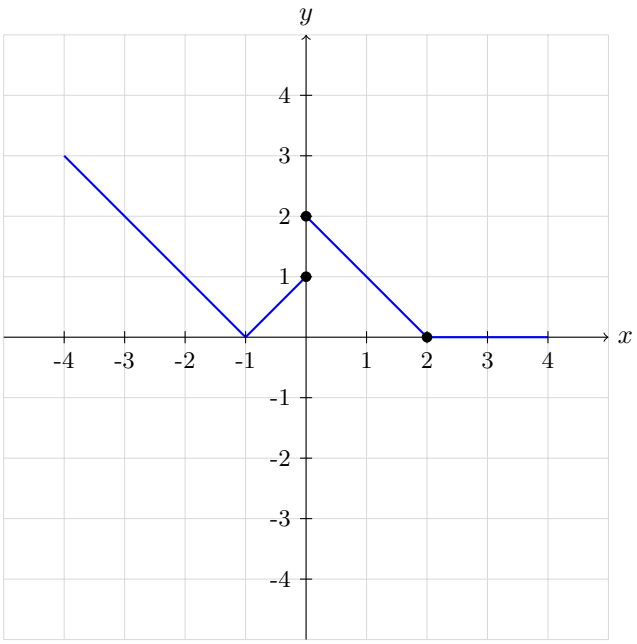
1. Function evaluations:

- $f(-2) = (-2)^2 - 4 = 4 - 4 = 0$
- $f(-1) = 2(-1) + 3 = -2 + 3 = 1$
- $f(0) = 2(0) + 3 = 3$
- $f(2) = -2 + 6 = 4$
- $f(3) = -3 + 6 = 3$

2. Graph of $g(x)$:



3. Graph of $h(x)$:



4. The piecewise function for the graph is:

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

5. The piecewise function for the graph is:

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