Step Functions

Unit 9
Warm up

Graph $f(x) = \begin{cases} 
| -x + 2 |, & x < 1 \\
-3, & 1 \leq x \leq 3 \\
\sqrt{x + 1}, & 3 < x \leq 8
\end{cases}$
Integer

• Talk to you neighbors about what is an integer?

• Whole numbers and their negative counterparts
• Numbers that are not fractions
Step Function

- A step function is a function whose graph resembles sets of stairs.
- Most famous step function is the Greatest Integer Function
  - $f(x) = \lfloor x \rfloor = \text{greatest integer } \leq x$
Greatest Integer Function

\[ f(x) = \lfloor x \rfloor \]

- Domain \((-\infty, +\infty)\)
- Range (all integers)
- Intercepts (0,0) and interval [0,1)
- Increasing intervals none
- Decreasing intervals none
- Constant intervals between each pair of consecutive integer values of \(x\)
- Relative min/max none
- Asymptotes none
- Symmetry none
Step Functions Example

• Graph $f(x) = \lfloor x \rfloor + 1$
Step Functions Example (cont.)

- \( f(x) = \lceil x \rceil + 1 \)
- Domain \((-\infty, +\infty)\)
- Range (all integers)
- Intercepts \((0,1)\) and interval \([-1,0)\)
- Increasing intervals none
- Decreasing intervals none
- Constant intervals between each pair of consecutive integer values of \(x\)
- Relative min/max none
- Asymptotes none
- Symmetry none
You Try!

- Graph $f(x) = \lfloor x \rfloor + 2$

- Domain $(-\infty, +\infty)$
- Range (all integers)
- Intercepts $(0,2)$ and interval $[-2,0)$
- Increasing intervals none
- Decreasing intervals none
- Constant intervals between each pair of consecutive integer values of $x$
- Relative min/max none
- Asymptotes none
- Symmetry none
Evaluating Step Functions

• Evaluate for \( f(5.2), f(-1.8) \) when \( f(x) = \lfloor x \rfloor - 2 \)

• \( f(5.2) = \lfloor 5.2 \rfloor - 2 \)
  • \( f(5.2) = 5 - 2 = 3 \)

• \( f(-1.8) = \lfloor -1.8 \rfloor - 2 \)
  • \( f(-1.8) = -2 - 2 = -4 \)