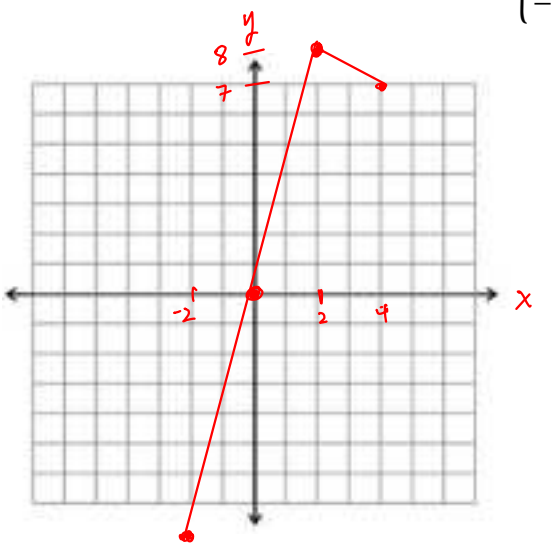
Example Sketch the graph of the function. What are the domain and range? Is f continuous on its entire domain?

$$f(x) = \begin{cases} 4x & \text{if } -2 \le x \le 2 \\ -\frac{1}{2}x + 9 & \text{if } 2 < x \le 4 \end{cases}$$



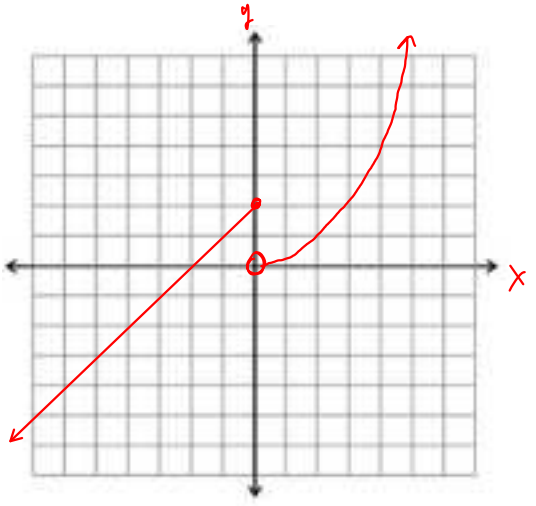
Domain: $[-2, 4]$

Range: $[-8, 8]$

The function is continuous on its entire domain.

Example Sketch the graph of the function. What are the domain and range? Is f continuous on its entire domain?

$$f(x) = \begin{cases} x + 2 & \text{if } x \le 0 \\ \frac{1}{2}x^2 & \text{if } x > 0 \end{cases}$$



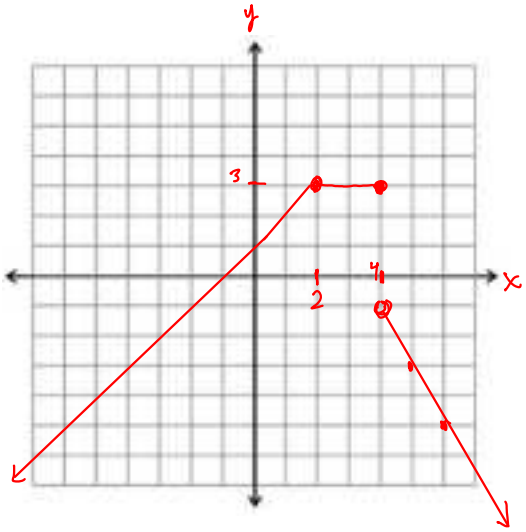
Domain: $\mathbb{R}$

Range: $\mathbb{R}$

The function has a jump discontinuity at $x=0$.

Example Sketch the graph of the function. What are the domain and range? Is f continuous on its entire domain?

$$f(x) = \begin{cases} x+1 & \text{if } x \le 2 \\ 3 & \text{if } 2 < x \le 4 \\ -2x+7 & \text{if } x > 4 \end{cases}$$



Domain: $\mathbb{R}$

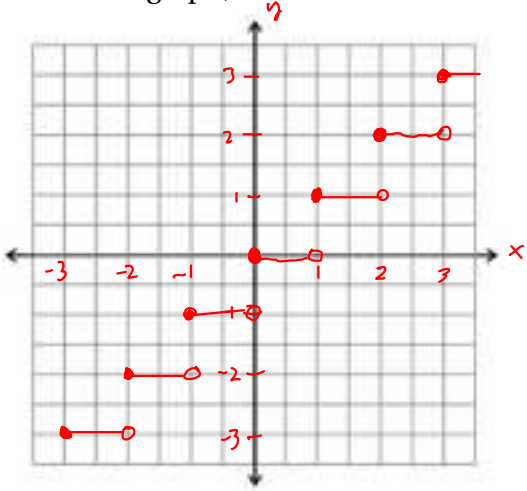
Range: $(-\infty, 3]$

Jump discontinuity at $x = 4$

The Step Function also known as the "greatest integer function" is defined as

$$f(x) =: [\![x]\!] = \begin{cases} x & \text{if } x \text{ is an integer} \\ \text{the greatest integer less than } x & \text{otherwise.} \end{cases}$$

Sketch the graph, state the domain and range, and identify all points of discontinuity.



$y = [\![x]\!]$

Domain: $\mathbb{R}$

Range: $\mathbb{Z}$ = integers only!

There is a jump discontinuity at each integer value of x.