Exercise 17

For the following exercises, find the domain, range, and all zeros/intercepts, if any, of the functions.

$$f(x) = -1 + \sqrt{x+2}$$

Solution

$f(x)$ has a square root function, so the domain is the set of all x where the argument is nonnegative.

$$x + 2 \geq 0$$

$$x \geq -2$$

Therefore, the domain is $\{x \mid x \geq -2\}$. The smallest value of $f(x)$ occurs when $x = -2$, $f(-2) = -1$, and $f(x)$ gets bigger and bigger as x gets larger and larger. The range is then $\{y \mid -1 \leq y < \infty\}$. Find the zeros now.

$$f(x) = -1 + \sqrt{x+2} = 0$$

$$\sqrt{x+2} = 1$$

$$x + 2 = 1$$

$$x = -1$$

The one x-intercept is $(-1, 0)$. Plug in $x = 0$ to the function: $f(0) = -1 + \sqrt{2} \approx 0.414$. Therefore, the y-intercept is $(0, -1 + \sqrt{2})$. Below is a graph of $f(x)$ versus x to confirm these results.