

Name: _____

1. What does it mean for a function, f , to be *even*?

f is *even* if for all x in the domain of f , $-x$ is also in the domain and $f(-x) = f(x)$. Alternatively, the graph of $y = f(x)$ is symmetric about the y-axis.

2. Consider the piece-wise defined function:

$$f(x) = \begin{cases} 2x + 6 & \text{if } x \leq -2 \\ |x| & \text{if } -2 < x < 1 \\ \sqrt{x} & \text{if } 1 \leq x \end{cases}$$

(a) What is the domain of f ?

$x \leq -2$ and $-2 < x < 1$ and $1 \leq x$, so the domain is *all real numbers*.

(b) What are the intercepts of f ?

$-2 < 0 < 1$ implies that $f(0) = |0| = 0$ so the y-intercept is $(0, 0)$.

x-intercepts can be found by setting $f(x) = 0$:

1) If $x \leq -2$, $2x + 6 = 0$, so $x = -3$. $-3 \leq -2$, so $(-3, 0)$ is an x-intercept.

2) $|x| = 0$ only if $x = 0$ and $-2 < 0 < 1$ implies $(0, 0)$ is an x-intercept as well.

3) $\sqrt{x} = 0$ implies $x = 0$, but $0 < 1$, so we do not consider this value.

Therefore the intercepts are $(0, 0)$ and $(-3, 0)$.

(c) On which open intervals is f increasing? Decreasing? Constant?

f is increasing on $(-\infty, -2)$ and $(0, \infty)$, and decreasing on $(-2, 0)$.

(d) Graph f .

