Unit 3
Polynomial Functions

Characteristics of Functions

Essential Questions

1. What is interval notation?
2. What is the domain & range of a function?
3. When is a function increasing, decreasing, & constant?
4. Where are the max & min of a function?

Let's Review!

When writing interval notation, remember…

- when you want **include** use a bracket [
- when you want to **exclude** use a parenthesis (

$$x < 2 \longrightarrow (-\infty, 2)$$

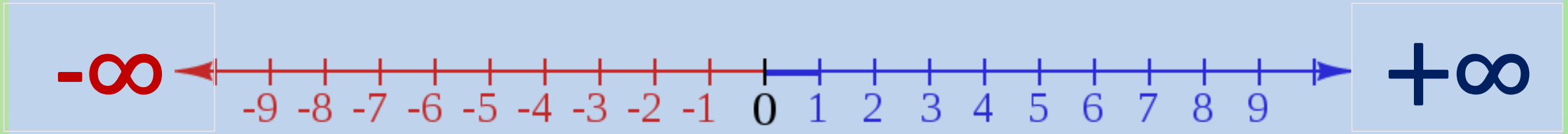
$$-4 \leq x < 9 \longrightarrow [-4, 9)$$

INTERVAL NOTATION SYMBOLS

< or >: Use Parentheses

≤ or ≥ : Use Brackets

+∞ or -∞: Use Parentheses

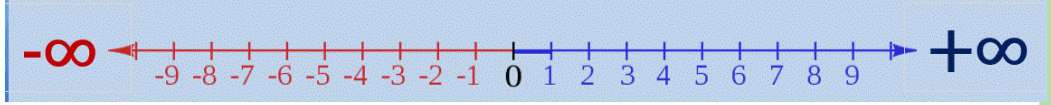


ON YOUR OWN

< or >: Use Parentheses

≤ or ≥ : Use Brackets

+∞ or -∞: Use Parentheses



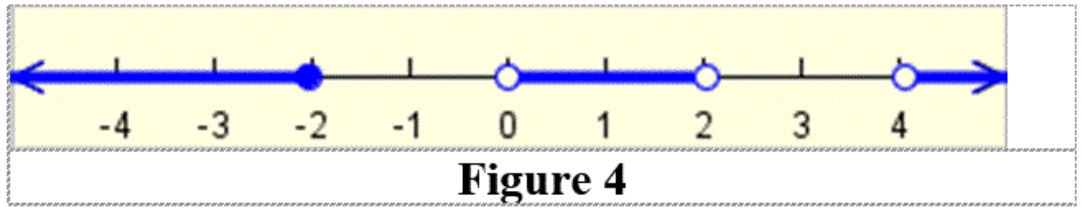


Figure 4

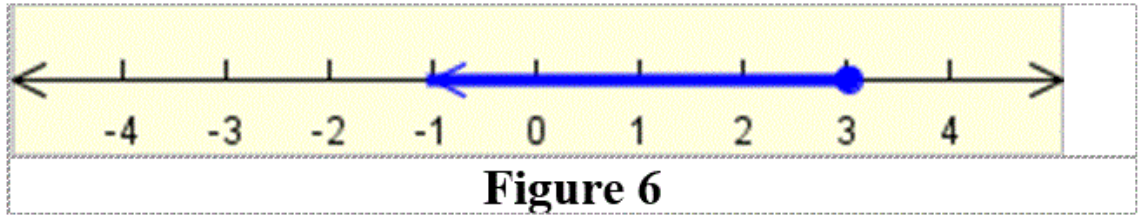


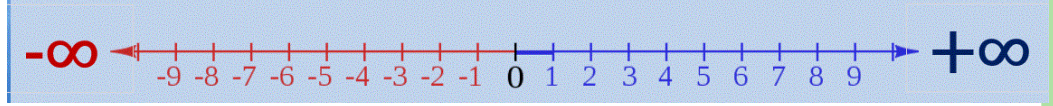
Figure 6

ON YOUR OWN

< or >: Use Parentheses

≤ or ≥ : Use Brackets

+∞ or -∞: Use Parentheses



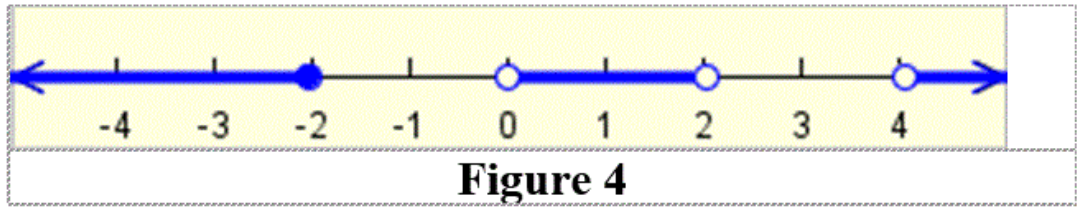


Figure 4

(-∞, -2] U (0, 2) U (4, +∞)

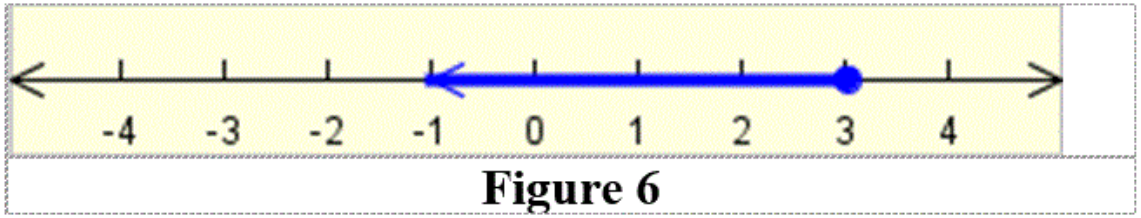


Figure 6

(-∞, 3]

Domain (x)

Domain is all the **inputs** of a function (**x- values**)

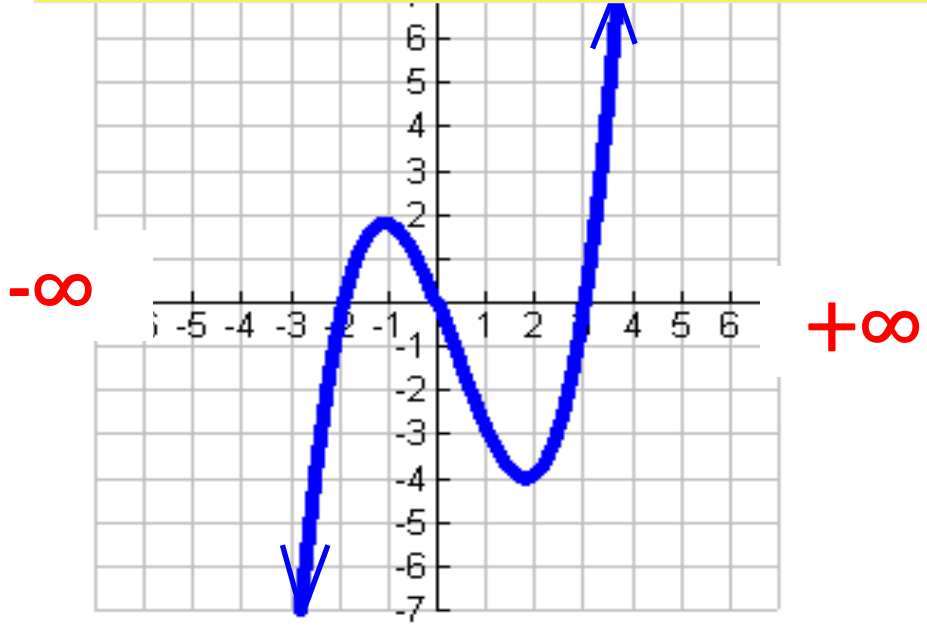
Domain is always ALL REAL NUMBERS! $(-\infty, \infty)$

*Remember that when you **read domain** on a graph, you read it from **LEFT to RIGHT**!*

DOMAIN

How do you find the **DOMAIN** of a graphed function?

Read the graph from left to right. Use x-values to describe where the graph begins and where the graph ends.



domain: **(-∞, +∞)**

Intervals of Increase and Decrease

Remember that a function is **increasing** on an **interval** if the function values **increase** as the input values **increase** within that **interval**.

Similarly, a function is **decreasing** on an **interval** if the function values **decrease** as the input values **increase** over that **interval**.

Use x-values to define intervals of increase and decrease.

Read the graph from left to the right.

Intervals of Increase/Decrease

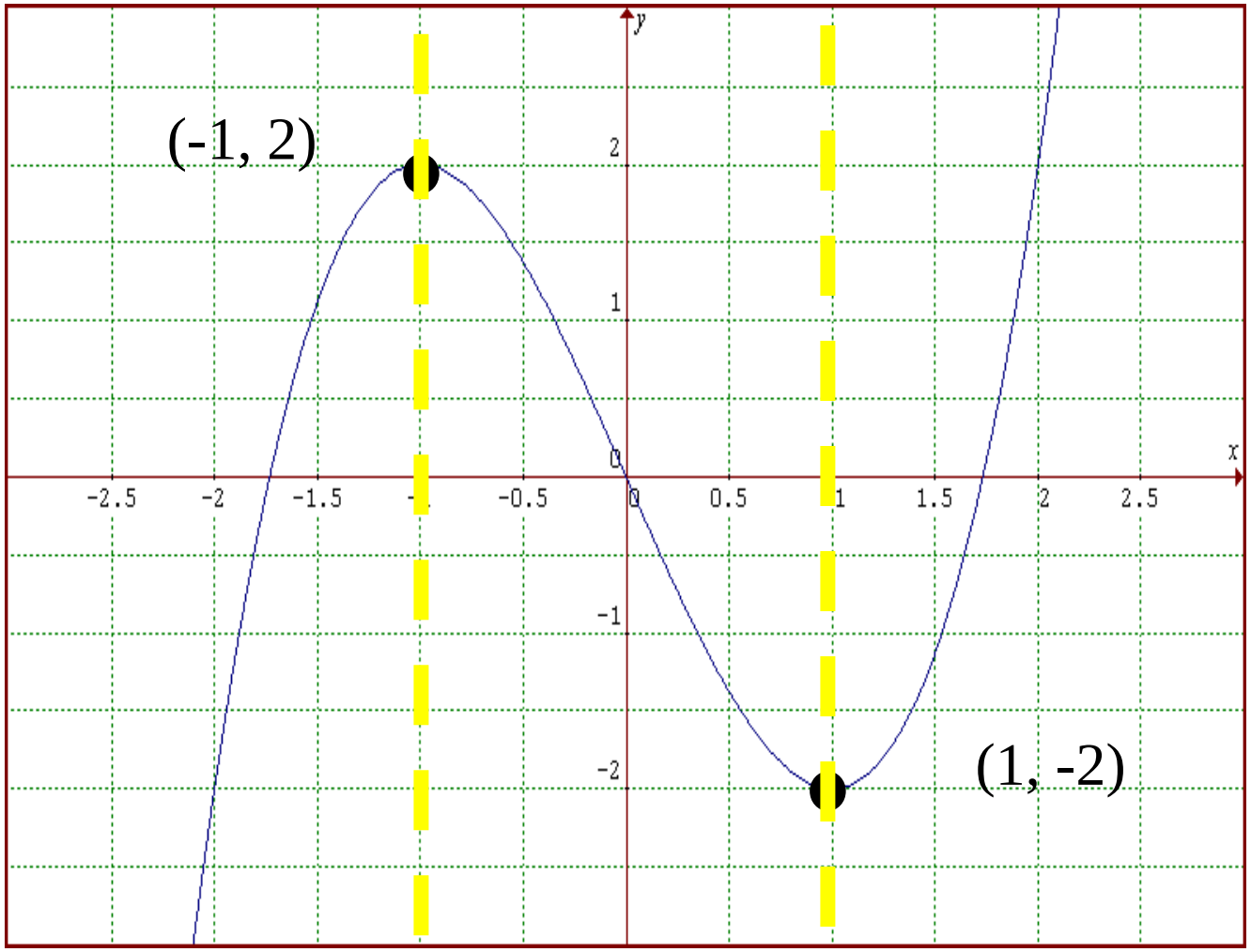
Points of inflection are the points on a graph where the direction changes.

Increasing to decreasing

Or

Decreasing to increasing

Remember to draw a line through your point of inflection and identify the x-value of that line. This will help you identify your intervals!



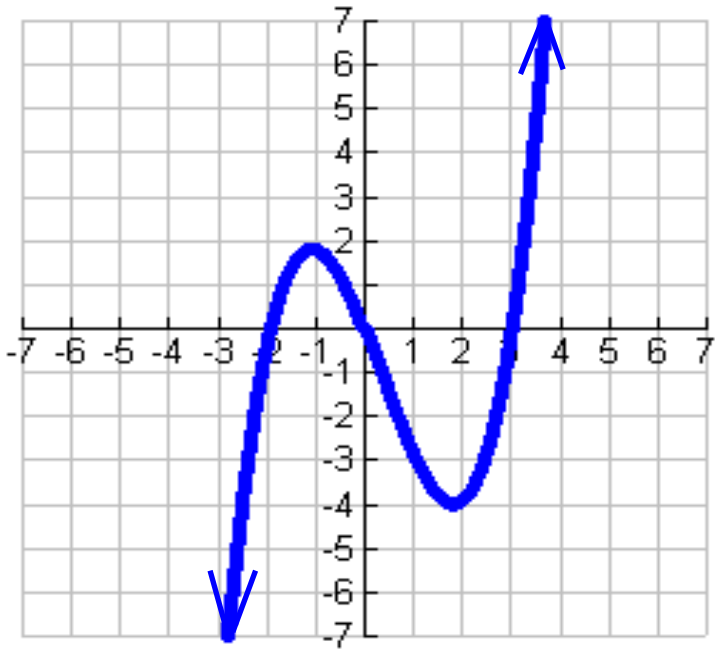
x = -1

x = 1

Intervals of Increase/Decrease

How do you find the **INTERVALS OF INCREASE OR DECREASE** of a graphed function?

Read the graph from left to right. Draw vertical lines at the beginning of the graph, end of the graph and inflection points.



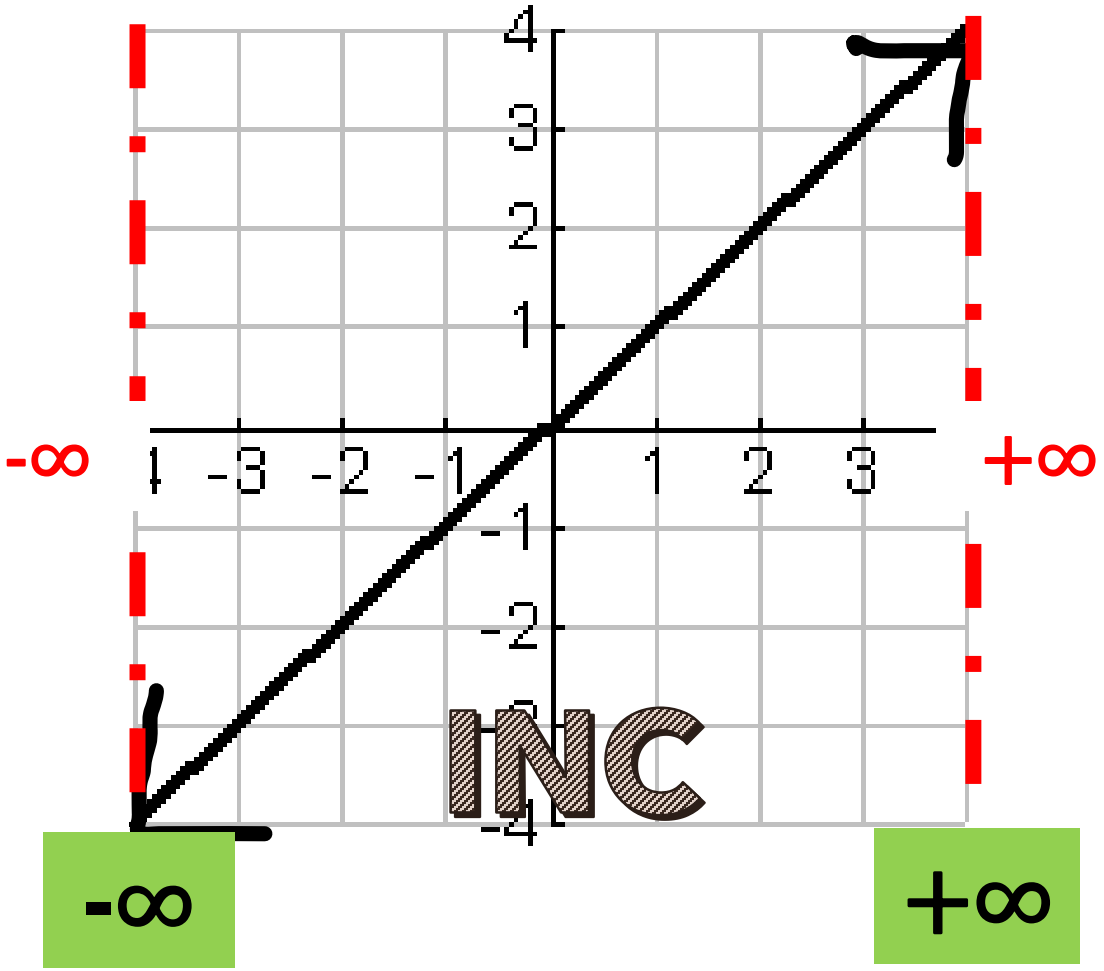
Interval of increase: $(-\infty, -1) \cup (2, +\infty)$

Interval of decrease: $(-1, 2)$

GUIDED PRACTICE

Linear

$$f(x) = x$$



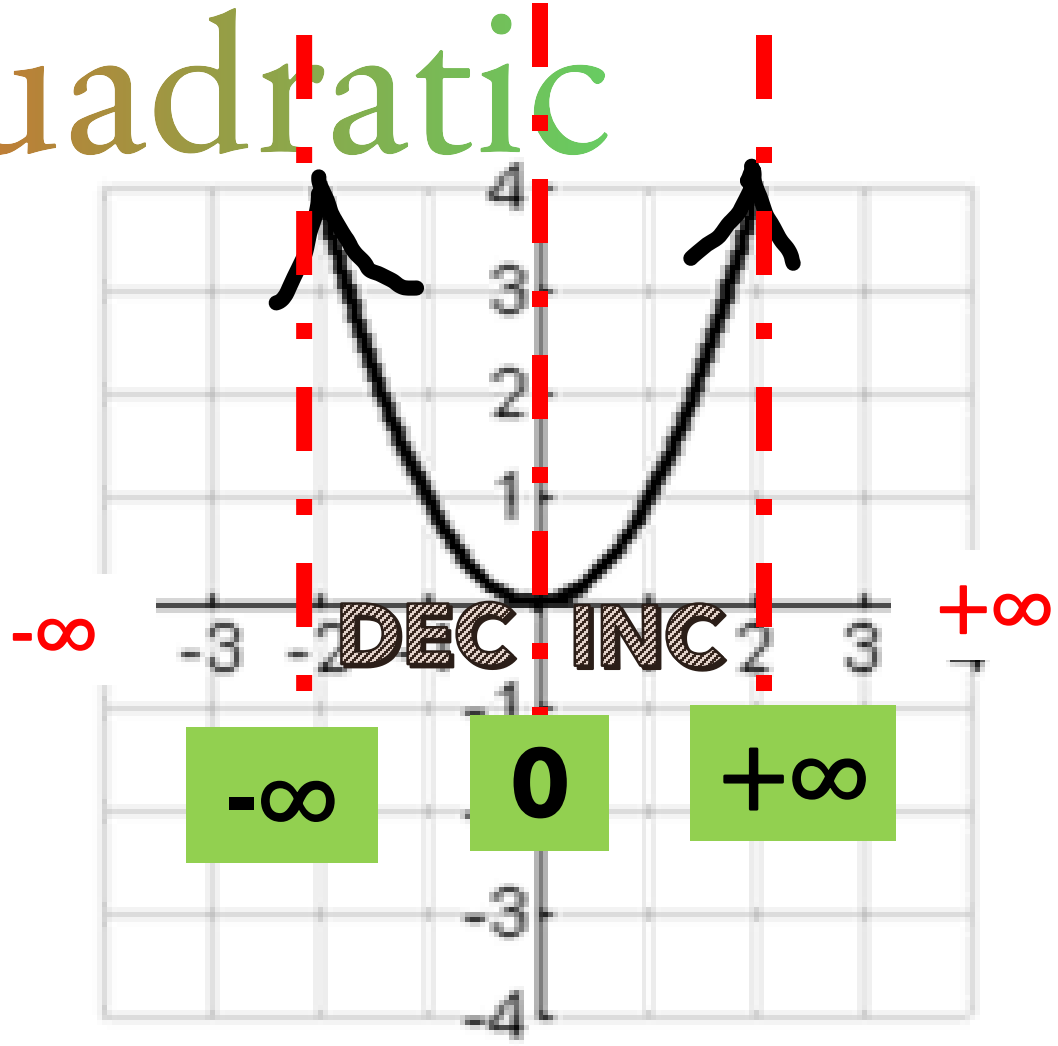
Domain: **(-∞, +∞)**

Interval of Increase: **(-∞, +∞)**

Interval of Decrease: NONE

Quadratic

$$f(x) = x^2$$



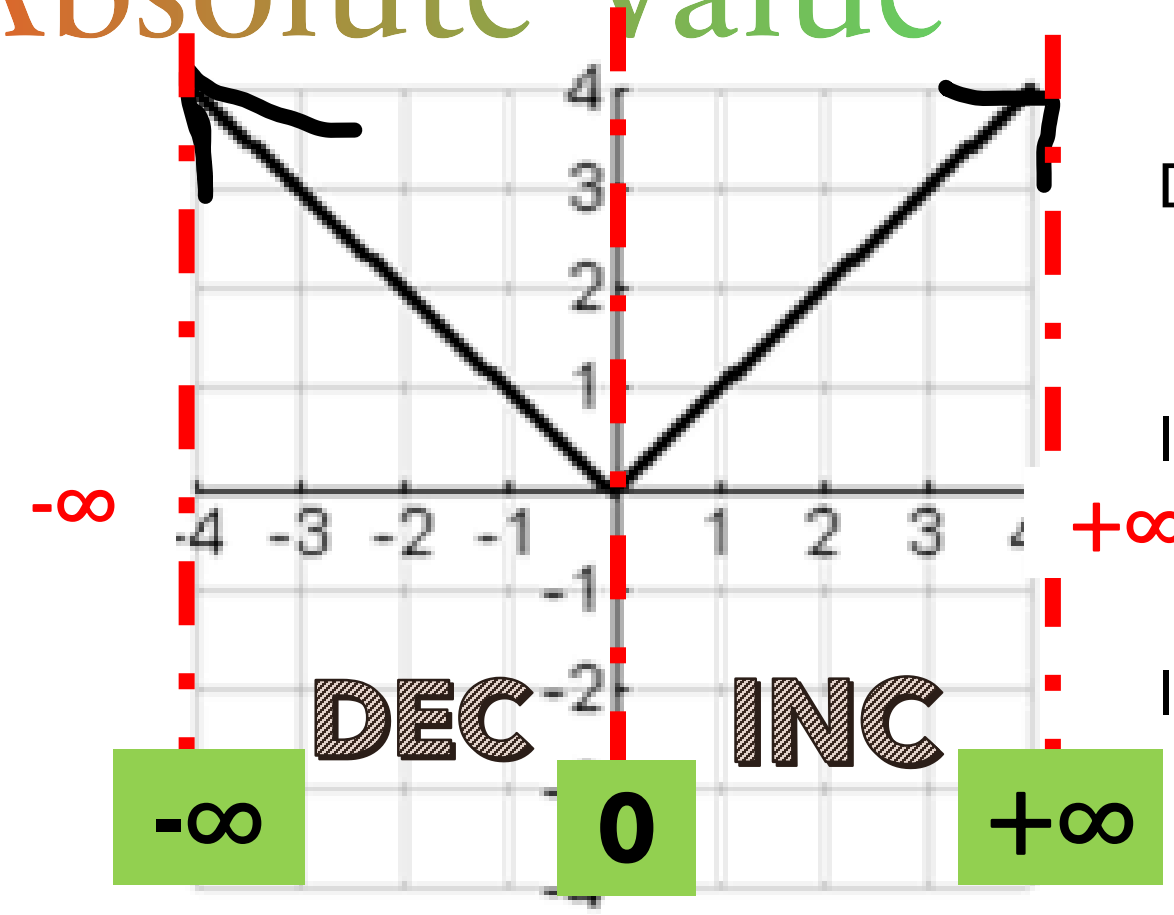
Domain: **(-∞, +∞)**

Interval of Increase: (0, +∞)

Interval of Decrease: (-∞, 0)

Absolute Value

$f(x) = |x|$



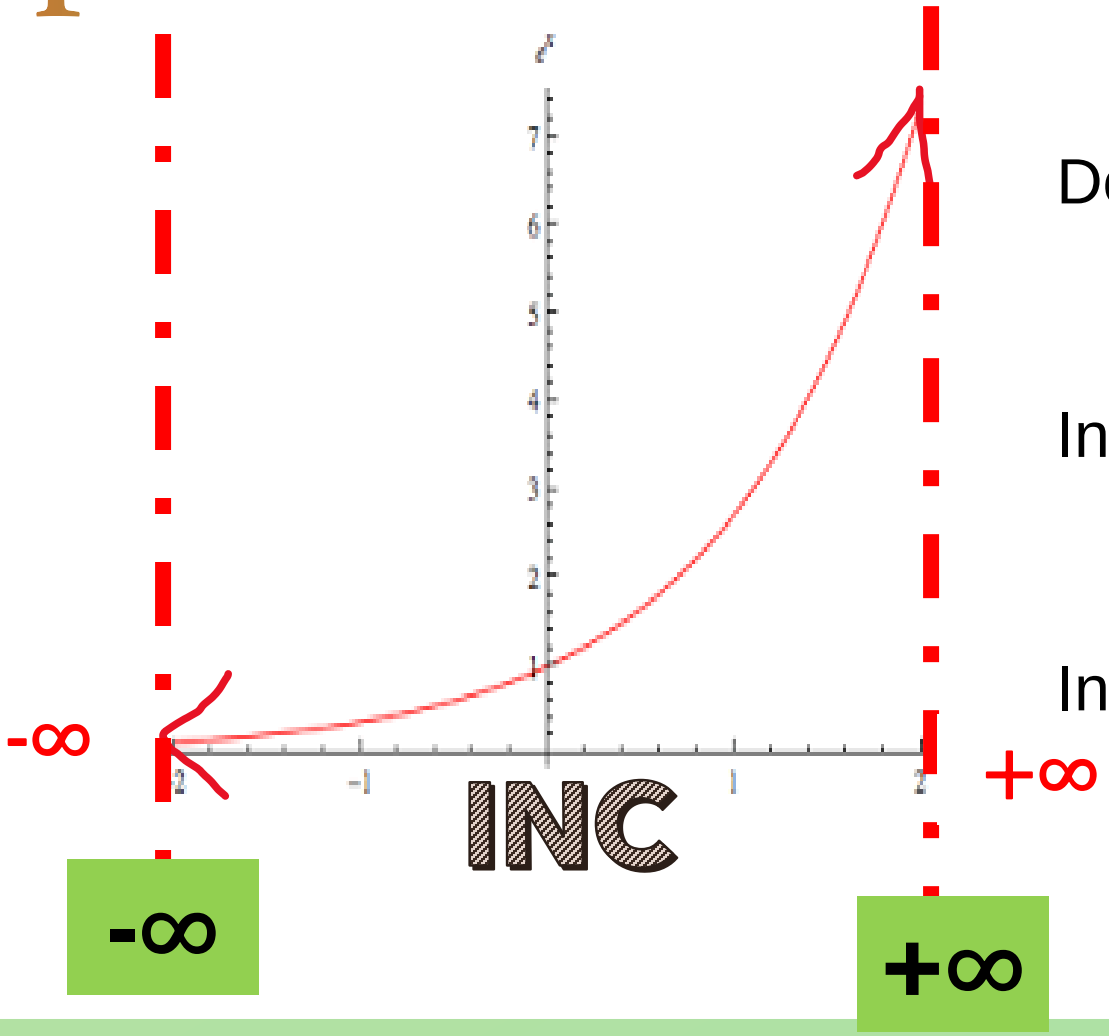
Domain: **(-∞, +∞)**

Interval of Decrease: (-∞, 0)

Interval of Increase: (0, +∞)

Exponential

$$f(x) = a^x$$



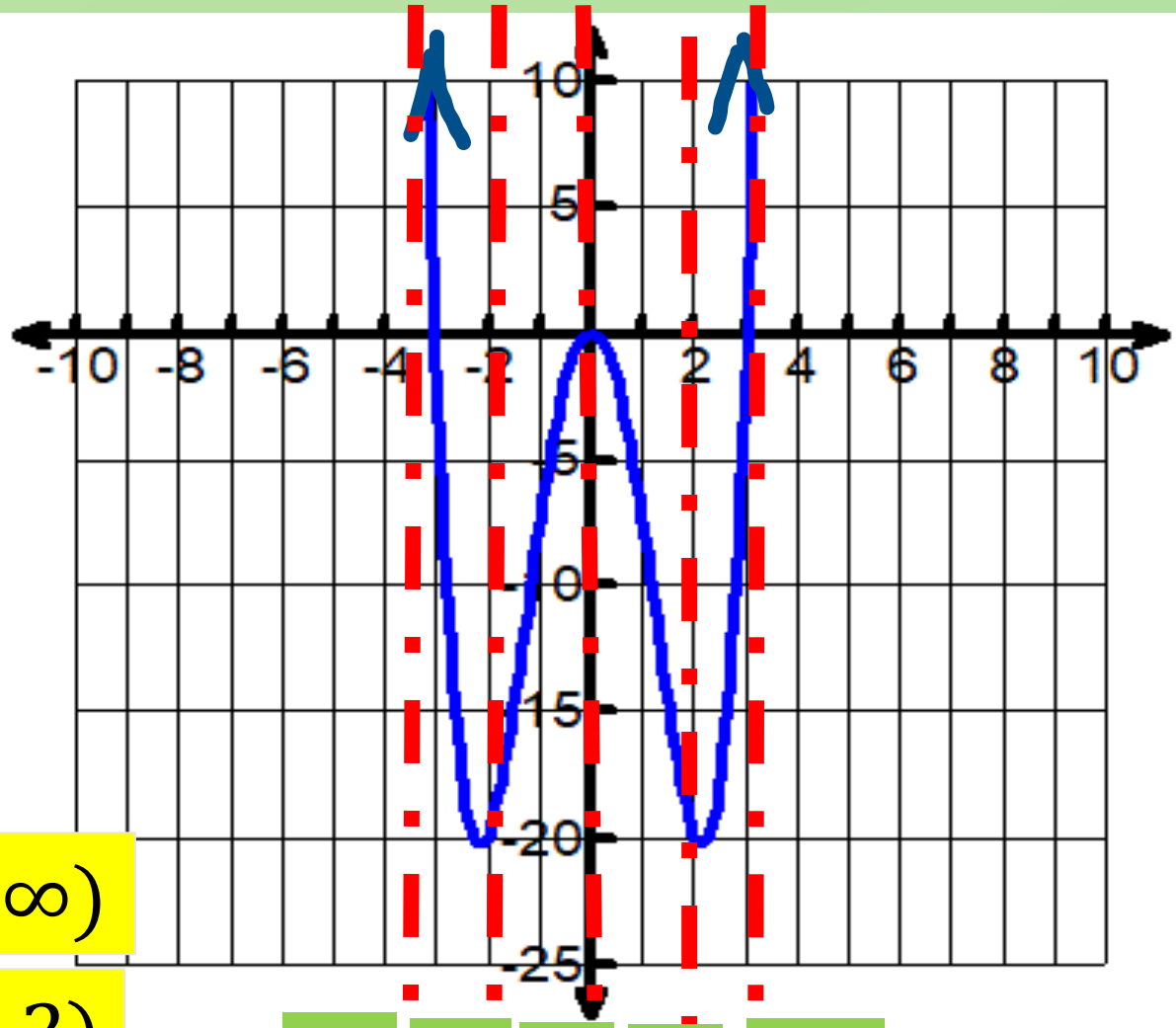
Domain: **(-∞, +∞)**

Interval of Increase: (-∞, +∞)

Interval of Decrease: NONE

Exit Ticket

Identify the domain of the function. Determine the intervals which the function domain is increasing and decreasing.



Domain (x) $(-\infty, +\infty)$

Increasing interval(s): $(-2, 0) \cup (2, +\infty)$

Decreasing interval(s): $(-\infty, -2) \cup (0, 2)$

-∞	-2	0	2	+∞
	INC		INC	
DEC		DEC		