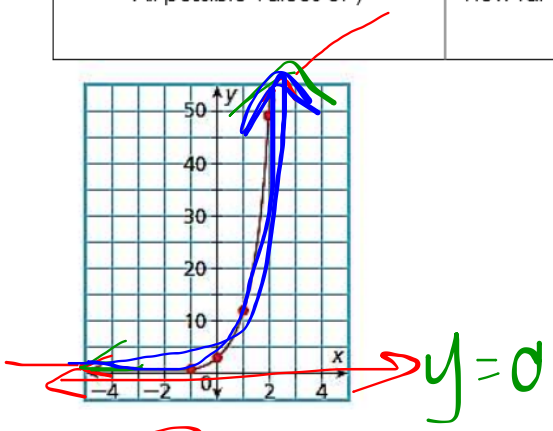
Algebra 1 Unit 7: Exponential Functions Notes

Day 3 – Characteristics of Exponential Functions

As you can hopefully recall, you learned about characteristics of functions in Unit 2 with linear functions and Unit 5 with quadratic functions. We are going to apply the same characteristics, but this time to exponential functions.

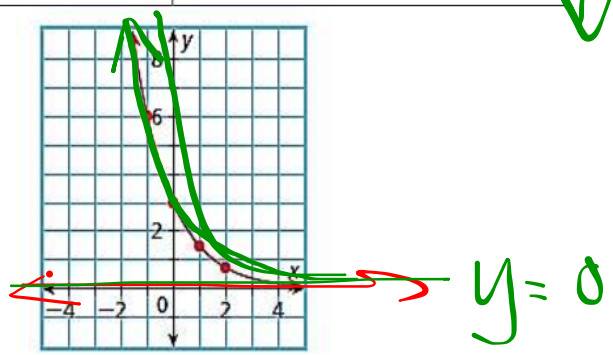
Domain and Range

Domain		
Define: All possible values of x	**Think:** How far left to right does the graph go?	**Write:** Smallest x ≤ x ≤ Biggest x *use < if the circles are open*
Range		
Define: All possible values of y	**Think:** How far down to how far up does the graph go?	**Write:** y < highest y value (opens down) y > lowest y value (opens up)



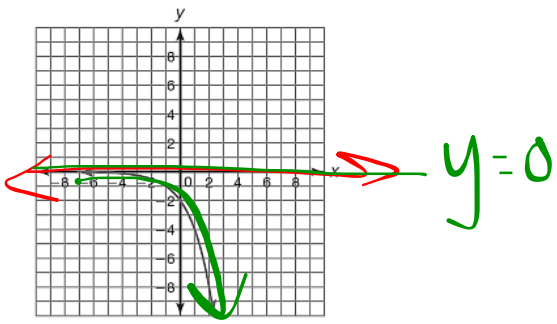
Domain: ℝ

Range: $y > 0$



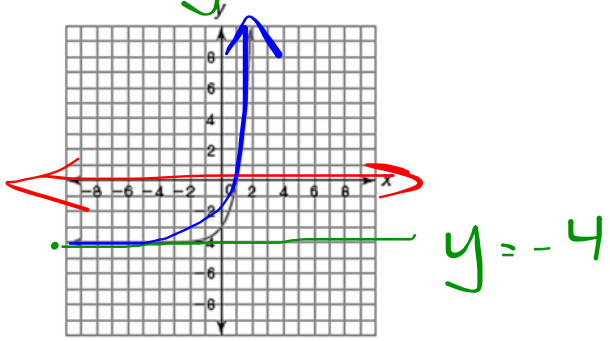
Domain: ℝ

Range: $y > 0$



Domain: ℝ

Range: $y < 0$



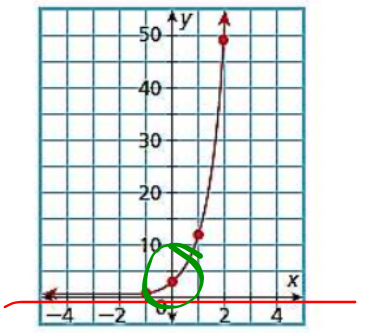
Domain: ℝ

Range: $y > -4$

Algebra 1 Unit 7: Exponential Functions Notes

Intercepts and Zeros

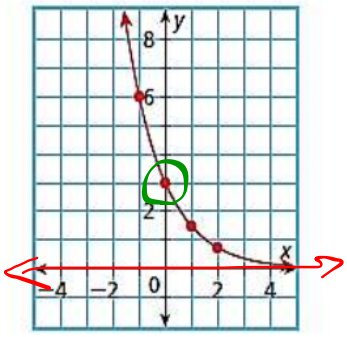
Y-Intercept		
Define: Point where the graph crosses the y-axis	**Think:** At what coordinate point does the graph cross the y-axis?	**Write:** (0, b)
X-Intercept		
Define: Point where the graph crosses the x-axis	**Think:** At what coordinate point does the graph cross the x-axis?	**Write:** (a, 0)
Zero		
Define: Where the function (y-value) equals 0	**Think:** At what x-value does the graph cross the x-axis?	**Write:** x = ____



y = 0

X-intercept: none Zero: none

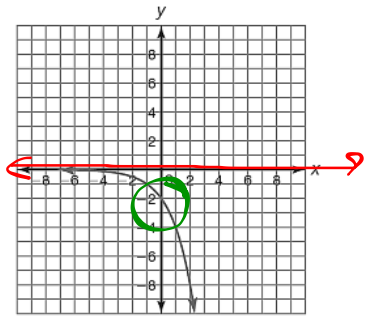
Y-intercept: (0, 4)



y = 0

X-intercept: none Zero: none

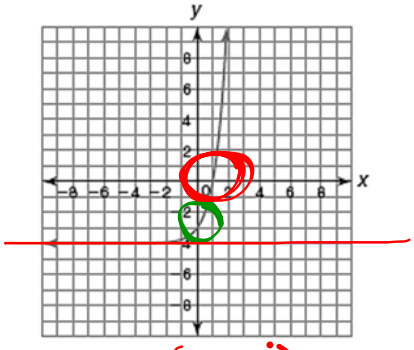
Y-intercept: (0, 3)



y = 0

X-intercept: none Zero: none

Y-intercept: (0, −2)



y = −4

X-intercept: (1, 0) Zero: x = 1

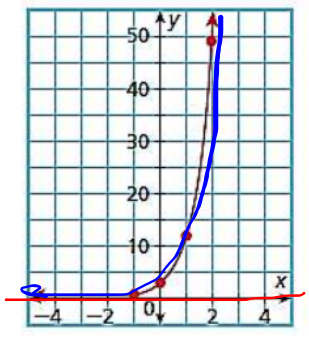
Y-intercept: (0, −3)

Algebra 1 Unit 7: Exponential Functions Notes

Extremas and Asymptotes

Maximum		
Define: Highest point of a function.	**Think:** What is my highest point on my graph?	**Write:** y =
Minimum		
Define: Lowest point of a function.	**Think:** What is the lowest point on my graph?	**Write:** y =
Asymptotes		
Define: A line that the graph get closer and closer to, but never touches or crosses.	**Think:** What values does my graph begin to flat line towards?	**Write:** y =

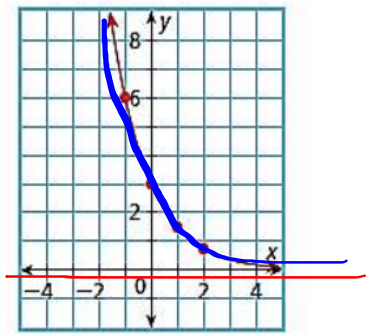
CHANGE DIRECTION



y = 0

Maximum: no Minimum: no

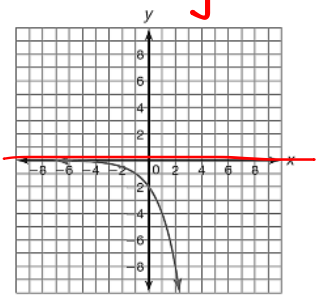
Asymptote: y = 0



y = 0

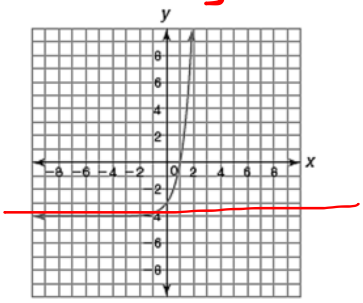
Maximum: no Minimum: no

Asymptote: y = 0



Maximum: no Minimum: no

Asymptote: y = 0



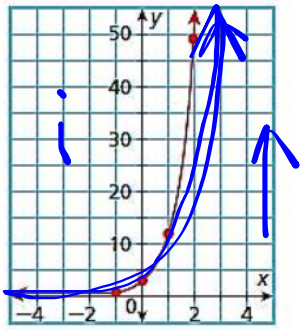
Maximum: no Minimum: no

Asymptote: y = −4

Intervals of Increase and Decrease

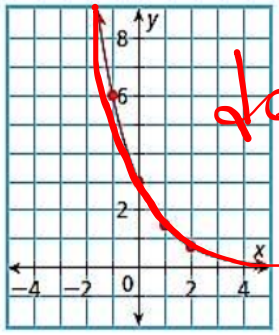
Interval of Increase		
Define: The part of the graph that is rising as you read left to right.	**Think:** From left to right, is my graph going up?	**Write:** An inequality using the x-value of the vertex
Interval of Decrease		
Define: The part of the graph that is falling as you read from left to right.	**Think:** From left to right, is my graph going down?	**Write:** An inequality using the x-value of the vertex

READ L → R



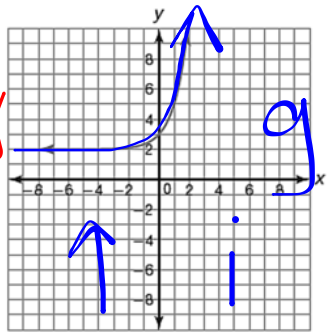
Interval of Increase: $(R$

Interval of Decrease: none



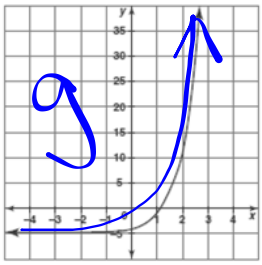
Interval of Increase: none

Interval of Decrease: $(R$



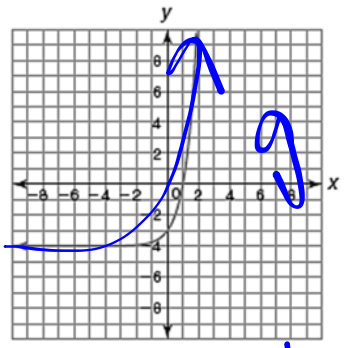
Interval of Increase: $(R$

Interval of Decrease: no



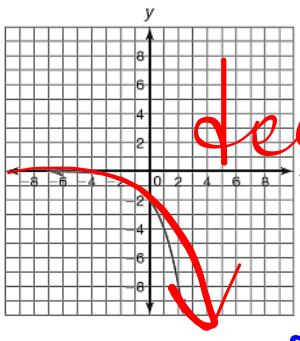
Interval of Increase: $(R$

Interval of Decrease: none



Interval of Increase: $(R$

Interval of Decrease: none



Interval of Increase: none

Interval of Decrease: $(R$

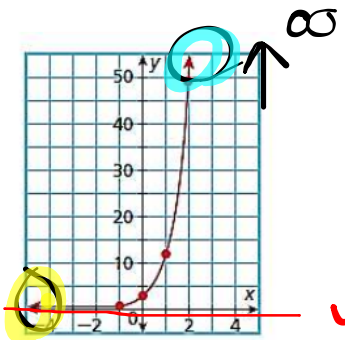
End Behavior

End Behavior

Define:

Behavior of the ends of the function (what happens to the y-values or f(x)) as x approaches positive or negative infinity. The arrows indicate the function goes on forever so we want to know where those ends go.

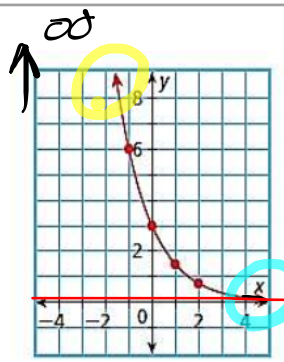
Think:	**Write:**
As x goes to the left (negative infinity), what direction does the left arrow go?	As x → -∞, f(x) → _____
Think:	**Write:**
As x goes to the right (positive infinity), what direction does the right arrow go?	As x → ∞, f(x) → _____



y = 0

As x approaches -∞, f(x) approaches 0.

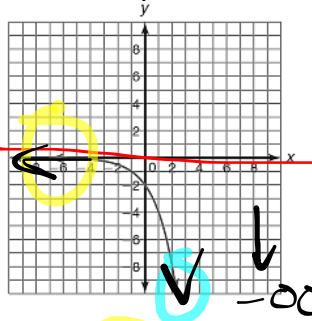
As x approaches ∞, f(x) approaches ∞.



y = 0

As x approaches -∞, f(x) approaches ∞.

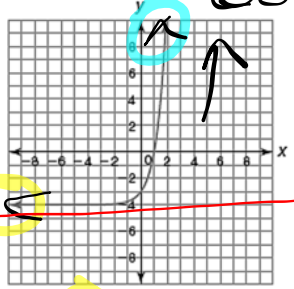
As x approaches ∞, f(x) approaches 0.



y = 0

As x approaches -∞, f(x) approaches 0.

As x approaches ∞, f(x) approaches −∞.



y = −4

As x approaches -∞, f(x) approaches −4.

As x approaches ∞, f(x) approaches ∞.