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Exponential Characteristics

Domain: the set of all first elements (inputs) of a relation. (x-values)

- Domain is always what w/ our function?
 $(-\infty, \infty)$

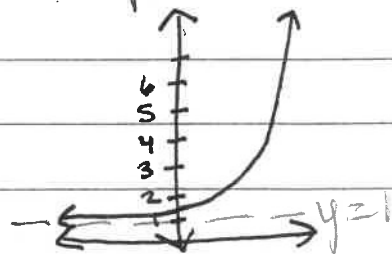
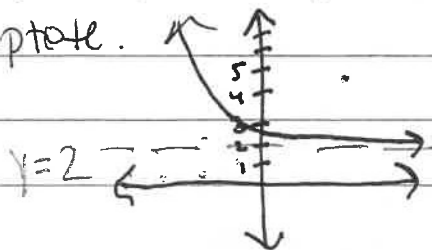
Range: the set of all the second elements (outputs) of a relation. (y-values)

y-intercepts: Also known as our initial value "a" in our equation. A point $(0, y)$ at which a graph crosses or touches the y-axis.

Increase/Growth: If our graph is rising from left to right (or equation $B > 1$).

Decrease/Decay: If our graph is falling from left to right (or equation $0 < B < 1$).

Asymptote: a value that you get closer and closer to but never quite reach. In an exponential function, a horizontal line ($y = ?$) represents the asymptote.



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Exponential Transformation

$$y = a(b)^{(x \pm c)} \pm d$$

Annotations:
- b : base (Not a transformation)
- $(x \pm c)$: $+$ Shift left, $-$ Shift right
- $\pm d$: $+$ Shift up, $-$ Shift down

a (whole #) > 1 : vertical stretch

a (fraction) $0 < a < 1$: vertical compression

$a (-)$: reflection across the x-axis

Remember your helpful hint:

If you add to "y"... go high...

If you add to "x"... go left!

ex) $y = (3)^{x-4} + 7$

Shift right 4 units
Shift up 7 units

ex) $y = -\frac{1}{2}(4)^x - 1$

reflection across the x-axis
vertical compression by $\frac{1}{2}$
Shift down 1 unit

ex) $y = 12(2)^{(x+5)} - 3$

Vertical stretch by 12
Shift left 5 & down 3 units