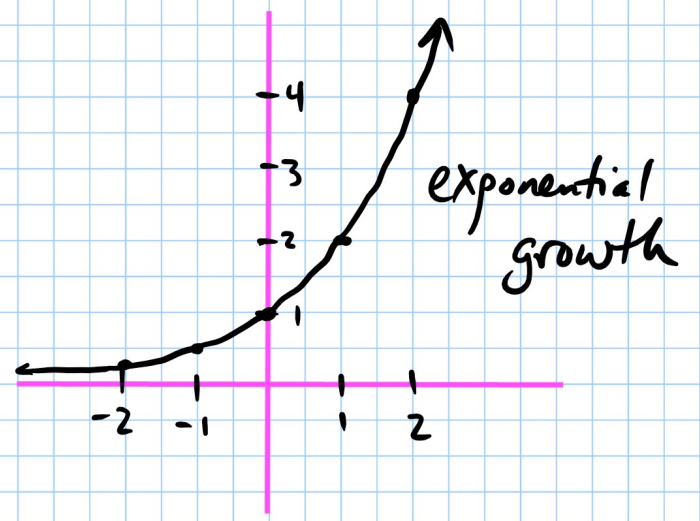
WARMUP

Fill in the chart and graph:

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

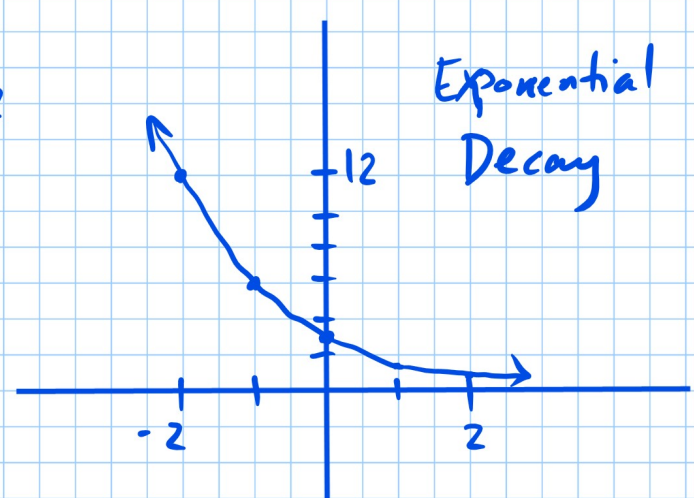
x	$f(x)$	
-2	$\frac{1}{4}$	$2^{-2} = \frac{1}{2^2} = \frac{1}{4}$
-1	$\frac{1}{2}$	$2^{-1} = \frac{1}{2}$
0	1	$2^0 = 1$
1	2	$2^1 = 2$
2	4	$2^2 = 4$



Section 4.2 Exponential Functions

ex: Graph $f(x) = 3 \cdot 2^{-x}$

x	y	
-2	12	$3 \cdot 2^{-(-2)} = 3 \cdot 2^2 = 3 \cdot 4 = 12$
-1	6	$3 \cdot 2^{-(-1)} = 3 \cdot 2^1 = 6$
0	3	$3 \cdot 2^{-0} = 3 \cdot 2^0 = 3$
1	$3/2$	$3 \cdot 2^{-1} = 3 \cdot \frac{1}{2}$
2	$3/4$	$3 \cdot 2^{-2} = 3 \cdot \frac{1}{4}$



On calculator, the ^ button is what we use to evaluate exponential expressions.

$$3^{2.236} = 11.664$$

$e^{1.2} = 3.320$

above LN

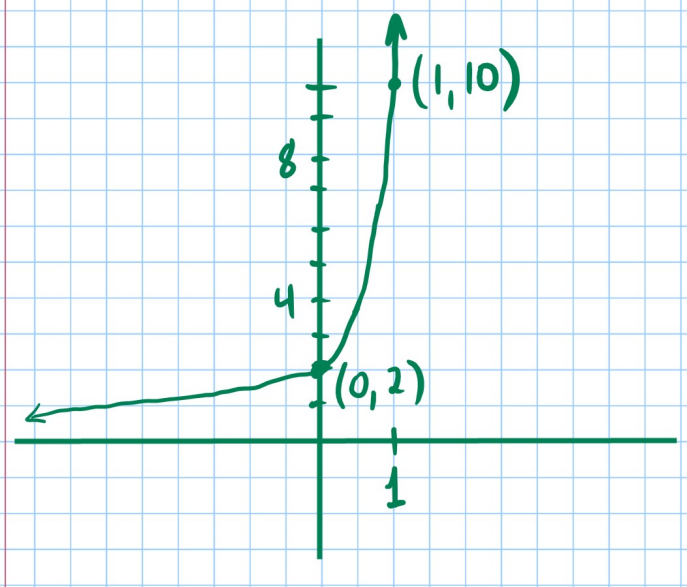
$e \approx 2.72$

$e = \lim_{n \to \infty} \left(1 + \frac{1}{n}\right)^n$

Euler

An <u>exponential function</u> can be written in the form $f(x) = a \cdot b^x$

b is the base $(b > 0,\ b \neq 1)$



$y = a \cdot b^x$ a is always the y-intercept

$2 = a \cdot b^0$

$2 = a \cdot 1$

$2 = a$

$y = 2 \cdot b^x$

$10 = 2 \cdot b^1$

$10 = 2b$

$5 = b$

$$\boxed{y = 2 \cdot 5^x}$$

Solving Exponential Equations

If $a^u = a^v$, then $u = v$

ex: $5^{1-2x} = \frac{1}{5}$

$5^{1-2x} = 5^{-1}$

write both sides with common base

$1-2x = -1$

$-2x = -2$

$x = 1$

ex: $9^{2x} = 27$

$(3^2)^{2x} = 3^3$

$3^{4x} = 3^3$

$4x = 3$

$x = \frac{3}{4}$

p297-298 6-10, 37, 41-53 odd

45) $x^3 = 2x$ ← $3^{x^3} = 9^x \Rightarrow 3^{x^3} = 3^{2x}$

$x^3 - 2x = 0$

$x(x^2-2) = 0$

$x = 0$ $\quad x^2 - 2 = 0$

$x^2 = 2$

$x = \pm\sqrt{2}$

$0, \sqrt{2}, -\sqrt{2}$