Learning Target(s): I am able to use functions involving the natural base *e*.

Notes: 7.3 Use Functions Involving e (Euler)

Natural base e – an irrational number.

$e \approx$ 2.718281828

Ex 1: Simplify the expression. ***FOLLOW** your rules of exponents (5.1 Foldable)*

a. $e^6 \cdot e^3$

add exponents

e^9

b. $\frac{18e^6}{2e^4}$ subtract exponents

$9e^{6-4}$

$9e^2$

c. $(4e^{3x})^2$ power to a power → multiply

$4^2 e^{3x \cdot 2}$

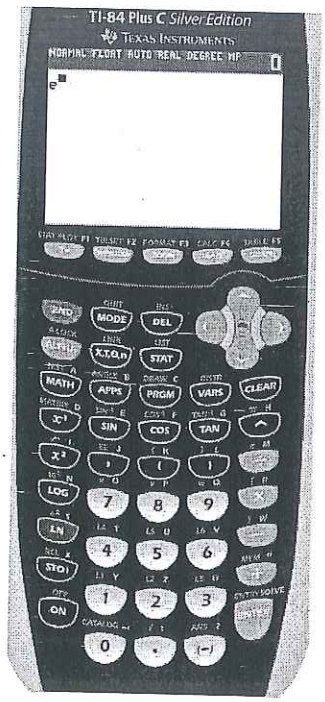
$16e^{6x}$

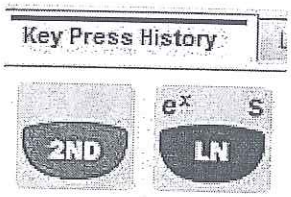
Ex 2: Use a calculator to evaluate the expression.

a. $e^{-2} \approx$ 0.135

1 2 3 4 → nearest thousandth

b. $e^{0.3} \approx$ 1.350





Natural Base Functions

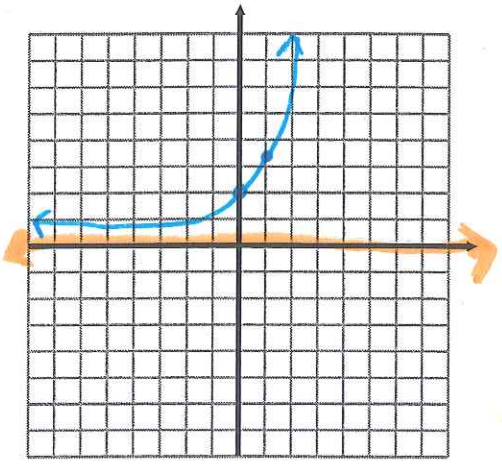
A function of the form $y = ae^{rx}$ is called a natural base exponential function.

- If $a > 0$ and $r > 0$, the function is an exponential growth function.
- If $a > 0$ and $r < 0$, the function is an exponential decay function.

$$y = ae^{r(x-h)} + k$$

Ex 3: Graph the function $y = 2e^{0.6x}$.

State the domain and the range.



x	y
0	2
1	3.6

r = 0.6 > 0 growth

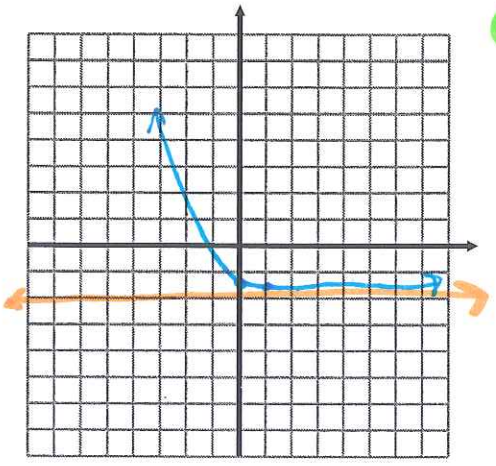
k = 0 asymptote

D: $\mathbb{R}$ R: $y > 0$

Ex 4: Graph the function $y = e^{-0.35(x+1)} - 2$.

State the domain and the range.

r = −0.35 < 0 decay



x	y
0	−1.3
1	−1.5

Graph shifts 1 unit left

Graph shifts 2 units down

D: $\mathbb{R}$ R: $y \geq -2$

Continuously Compounded Interest

$A = Pe^{rt}$

P = initial amount

r = rate (decimal)

t = time (years)

Compounded Periodically

$A = P\left(1 + \frac{r}{n}\right)^{nt}$

7.1 & 7.2 Notes

Ex 5: You deposit $3500 in an account that pays 4% annual interest compounded continuously. What is the balance after 2 years?

0.04

0.04 · 2

$A = 3500e$

$A = \$3791.50$