

Lesson 4.2: The Natural Exponential Function

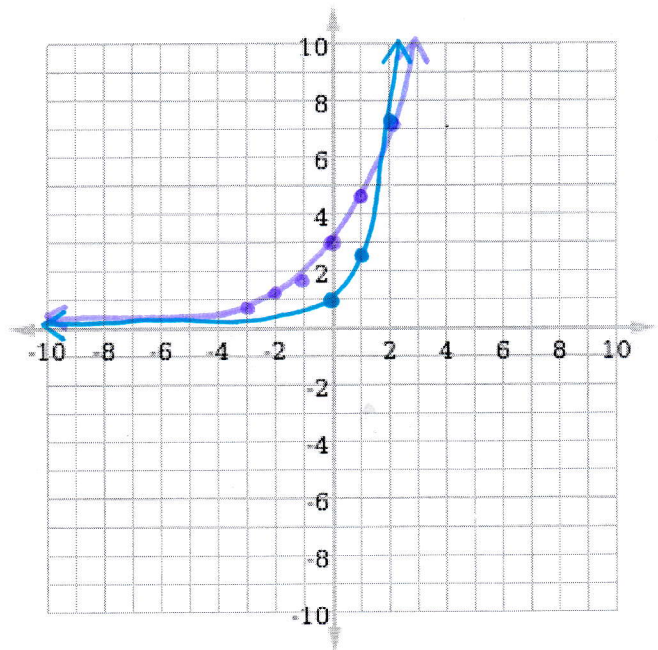
The Natural Exponential Function

The **natural exponential function** is an exponential function with base e .

*Note:
 $e \approx 2.718$

$$f(x) = ae^x$$

Example: Graph the functions $f(x) = e^x$ and $f(x) = 3e^{0.5x}$ on the same axes.



What is the difference between the two functions?

$f(x) = e^x$ has a y-intercept at $(0, 1)$ & $f(x) = 3e^{0.5x}$ has a y-intercept at $(0, 3)$. Also, $f(x) = e^x$ seems to increase faster than $f(x) = 3e^{0.5x}$.

Continuously Compounded Interest

Continually compounded interest is calculated by the formula:

$$A(t) = Pe^{rt}$$

$A(t)$ = amount after t years (# of years)
 P = principal
 r = interest rate per year

Example: Find the amount after 3 years if \$1,000 is invested at an interest rate of 12% per year, compounded continuously.

$$A(3) = (1000)e^{(0.12)(3)}$$

$$A(3) \approx 1,433.33$$

The investment will be worth about \$1,433.33