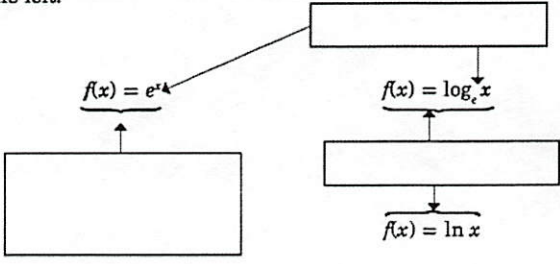


Notes 6.5 – Base e and Natural Logarithms

- I understand what a natural logarithm is
- I can solve natural log problems using base e
- I can simplify expressions with e and the natural log
- I can solve base e equations
- I can solve story problems with continuously compounded interest.

THE NATURAL BASE e
 The natural base e is irrational. It is defined as follows:
 As n approaches +∞, $(1 + \frac{1}{n})^n$ approaches
 $e \approx \underline{\hspace{2cm}}$.

New Vocabulary Label the diagram with the terms listed at the left.



Simplify natural base expressions:

- a. $e^6 \cdot e^3 = e$ b. $\frac{18e^6}{2e^4} =$ c. $(4e^{3x})^2 =$

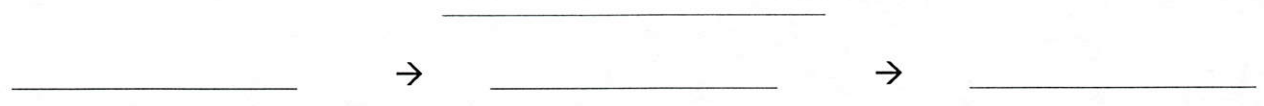
Evaluate natural base expressions:

- Use a calculator to evaluate the expression:
 a. $e^{-2} =$ b. $e^{0.3} =$
1. Simplify $e^{-3} \cdot e^6$ 2. Simplify $\frac{(4e^3)^2}{8e^5}$

Use a calculator to evaluate the expression:

3. e^{-3} 4. $e^{0.36}$.

Write an equivalent base e exponential equation for a natural logarithmic equation by using:



- a. $\ln x = 3$ b. $e^x = 38$

Write each expression in another form, then use a calculator to evaluate. Check your answer by substituting into the original expression.

$e^x = 15$	→	$x =$	→	_____	→	_____
$e^x = -22$	→	_____	→	_____	→	_____
$\ln x = 2$	→	_____	→	_____	→	_____
$\ln x = -5$	→	_____	→	_____	→	_____

Simplify Expressions with e and the Natural Log:

Write each expression as a single logarithm.

a. $3 \ln 10 - \ln 8 =$

You try ☺

1. $3 \ln 3 - \ln 9$

2. $4 \ln 16 - \ln 256$

3. $2 \ln x + 2 \ln 4$

4. $3 \ln 4 + 3 \ln 3$

Solve Base e equations:

$4e^{-2x} - 5 = 3$

$6e^{0.25x} + 8 = 20$

You try ☺

1. $3^{7x-3} = 9^{2x}$

2. $5^x = 72$

3. $8^{3x+2} - 6 = 5$

4. $3e^{0.5x} + 2 = 5$

Solve Base e inequalities:

$2e^x \leq 17.4$

$-4 \ln x^3 > -72$

You try ☺

$-3e^x \leq -15.6$

$7 \ln x^2 < 83$

Continuously Compounded Interest:

Describe each variable and identify its value from the real-world problem.

Ming-Na puts \$600 in a savings account in which interest is compounded continuously. How much money will she have after 5 years if the annual interest rate is 4%?

