Concept and Examples
The Number e

Based on power point presentations by Pearson Education, Inc.
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Learning Objective

Evaluate a number containing ***e***.

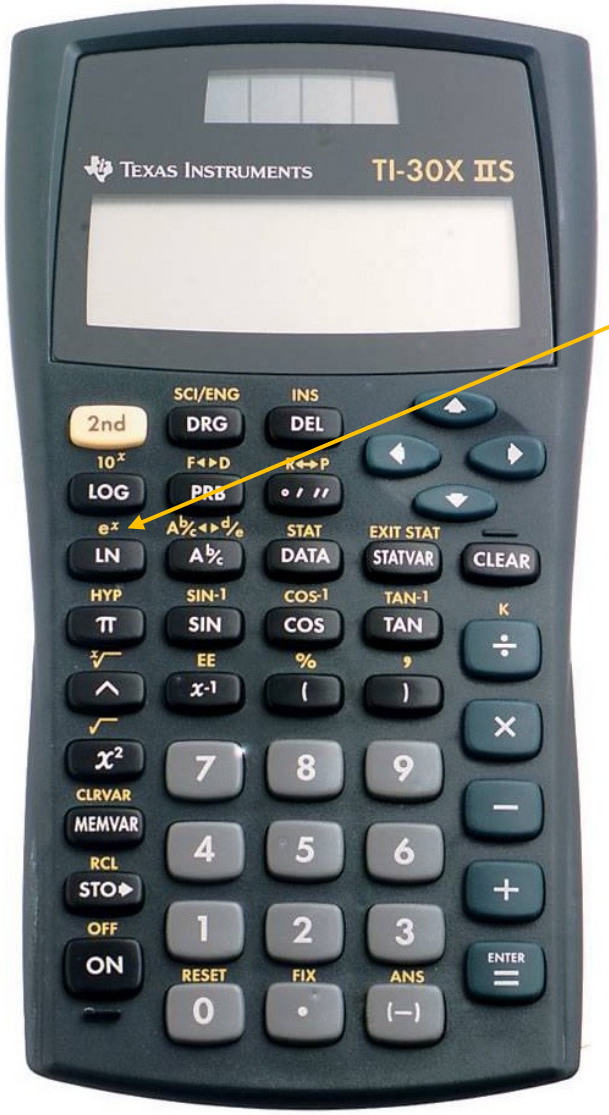
The Number *e* (1 of 2)

The number ***e*** occurs quite frequently in the sciences and banking. It is an irrational number often rounded to *2.72*.

The number was discovered by the Swiss mathematician Jacob Bernoulli in 1683 while studying compound interest. He wanted to know that happens to the expression $\left(1+\frac{1}{n}\right)^n$ when *n* gets infinitely large. He found that its value never becomes larger than 2.718281828... .

The the first appearance of ***e*** was in the publication "Mechanica" in 1736 by the Swiss mathematician Leonard Euler. The number ***e*** is also known as **Euler's number**.

The Number e (2 of 2)



Examining any calculator, we find that there is NO button containing the number e. However, we can find the picture e^x over the LN button. This means that we must use the 2nd button to access the number. To find the value of e, we input the following:

2nd	LN	1	)	Enter

We find that $e \approx 2.718281828$.
Note that we used the power of 1 to find the value of the number e.

The calculator does not tell us that e is an irrational number. It simply fills up all available slots on its screen with decimal places. YOU must know that it is an irrational number with infinitely many decimal places.

Example 1: Evaluate a Number containing ***e***

Evaluate $\frac{3}{e}+4$ using the calculator. Round to 2 decimal places. Do not use 2.72 for ***e***.

We find that $\frac{3}{e}+4 \approx 5.10$.

Example 2: Evaluate a Number containing e

Evaluate $e^2 - 1$ using the calculator. Round to 3 decimal places. Do not use 2.72 for e.

We find that $e^2 - 1 \approx 6.389$

Example 3: Evaluate a Number containing e

Find the decimal approximations of e^x given $x = -3, -2, -1, 0, 1, 2,$ and 3. Round to four decimal places.

x	e^x
-3	$e^{-3} \approx 0.0498$
-2	$e^{-2} \approx 0.1353$
-1	$e^{-1} \approx 0.3679$
0	$e^0 = 1$
1	$e^1 \approx 2.7183$
2	$e^2 \approx 7.3891$
3	$e^3 \approx 20.0855$