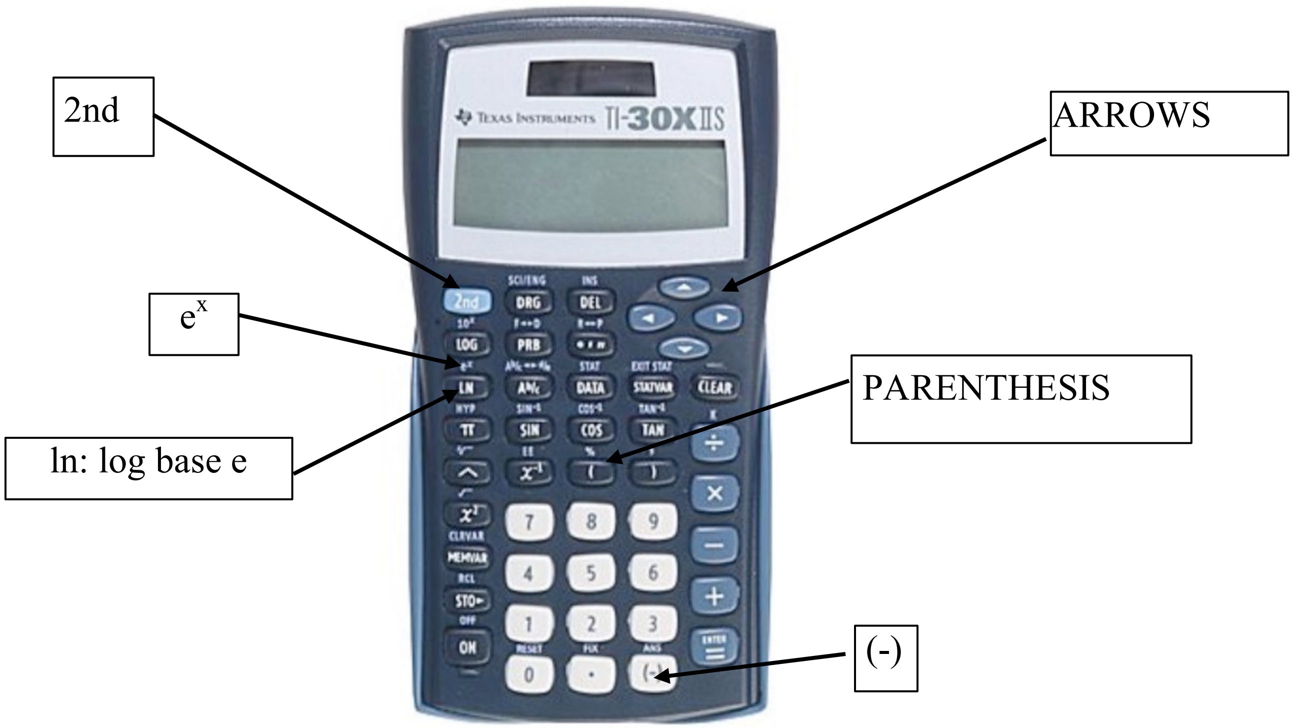
The TI-30X IIS Calculator and Base e



Many application problems require using the natural base or base e. The symbol ‘e’ represents an irrational number similar to π.

e ≈ 2.71828

- Raising e to a power: e^5 is found by inputting: 2nd ln 5 =

You screen will look like: e^(5	148.4131591

- Raising e to a negative power: e^{-3} is found by inputting: 2nd ln (-) 3) =,

You screen will look like: e^(-3	0.049787

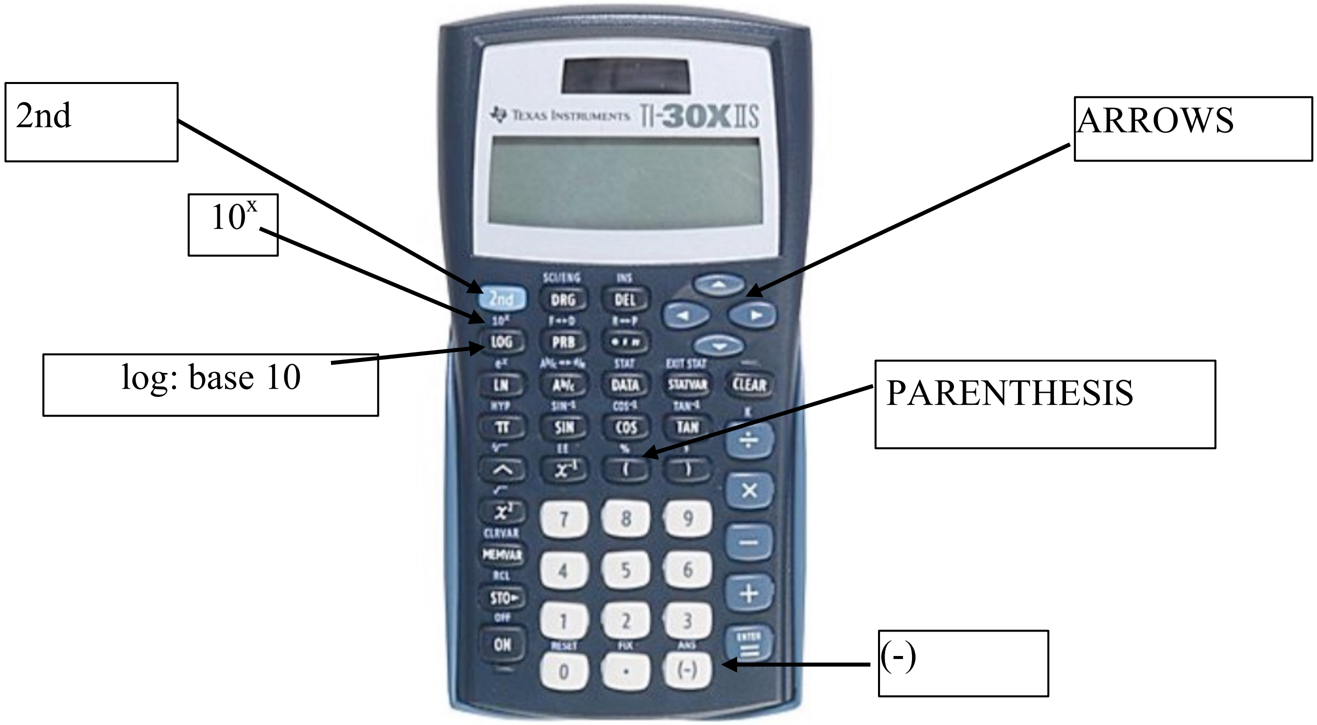
The inverse function for exponentials is logarithms. For base e this requires using the natural log or ln.

- To take the natural log of a number 45, ln(45), is found by inputting: ln 45) =,

You screen will look like: ln(45)	3.80666249

Note that the calculator inserts the left parenthesis when you input ln. Remember that you can’t take the log of a negative number so if you input ln(-45) you will get an error message.

The TI-30X IIS Calculator and Base 10



Many application problems require using the common base or base 10.

- Raising 10 to a power: 10^5 is found by inputting: 2nd log 5 =,

You screen will look like: 10^(5 **100000**

- Raising 10 to a negative power: 10^{-3} is found by inputting: 2nd log (-) 3 =,

You screen will look like: 10^{-3} **0.001**

2nd PRB changes the answer to a fraction. The screen will look like 1 / 1000

- Raising 10 integer powers is just a matter of moving the decimal point, so a calculator is really only needed when raising 10 to a fractional exponent.

$10^{3/4}$ is found by inputting: 2nd log (3 ÷4) =,

You screen will look like: 10 ^ (3 / 4) 5.623413252

Many applications involve using the inverse or common log (log base 10) function.

- To take the **common log** of a number: [log] the number [)] =, log(45) is found by inputting: [log] 45 [)] =

You screen will look like: log(45)	1.653212514

- If you need to take the log to a base other than 10 or e, use the change of base formula first.

$$log_b(N) = \frac{log(N)}{log(b)} \quad \text{hence} \quad log_3(34) = \frac{log(34)}{log(3)}$$

Input [log] 34[)] [÷] [log] 3 [)] =,

You screen will look like: log(34) / log(3)	**3.209831677**

1. Applications involving base e:

Population growth is given as $P(t) = P_o e^{kt}$ where P_o is the original population, k is the growth rate and t is the time. Suppose you are asked to find the population after 2 years given the original population was 2500 and the growth rate is 5%.

The values you have are $P_o = 2500$, t = 2 and k = 0.05, hence input: 2500 [2nd] [ln] 0.05 [×] 2 [)] =

You screen will look like: 2500 e^(0.05*2)	**2762.927**

2. Applications involving base 10:

The measure of the intensity of an earthquake is given as a Richter Scale value using the equation

$$R = log(\frac{A}{P})$$

where A is the amplitude of the ground's vibrations (in micrometers) and P is the time (in sec.) it takes for the ground to oscillate one time.

Suppose that the ground oscillated 5000 micrometers every 0.2 sec., what is the Richter scale value?

A = 5000 and P = 0.2

hence $R = log(\frac{5000}{0.2})$

Input: [log] 5000 [÷] 0.2[)] =

You screen will look like: log(5000/0.2)	4.397940009