

The natural base "e"

What is e? a number that never stops and never repeats, its just a button on the calculator

Use a calculator to evaluate the expression. Write all decimal places (do not round).

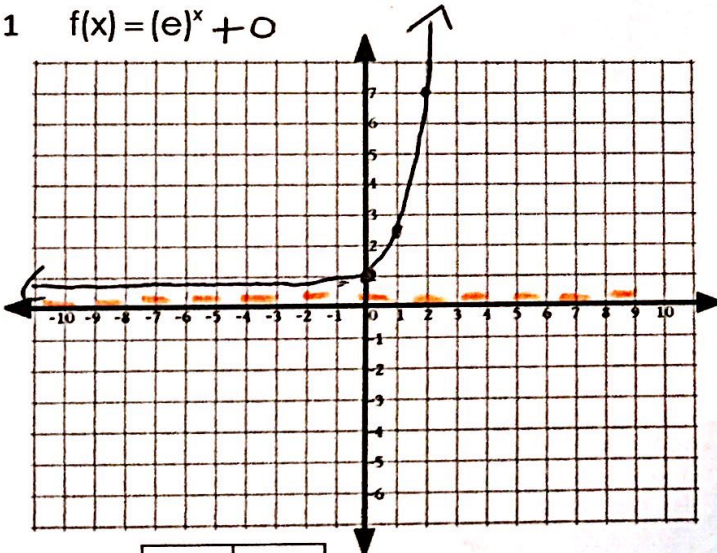
e = 2.718281828

Which mathematical concept does this make you think of? π

Like pi, the natural base "e" is an irrational number. It can be approximated to 2.718. Because of its natural limiting value, it is often used as the base of the exponential function in realistic applications.

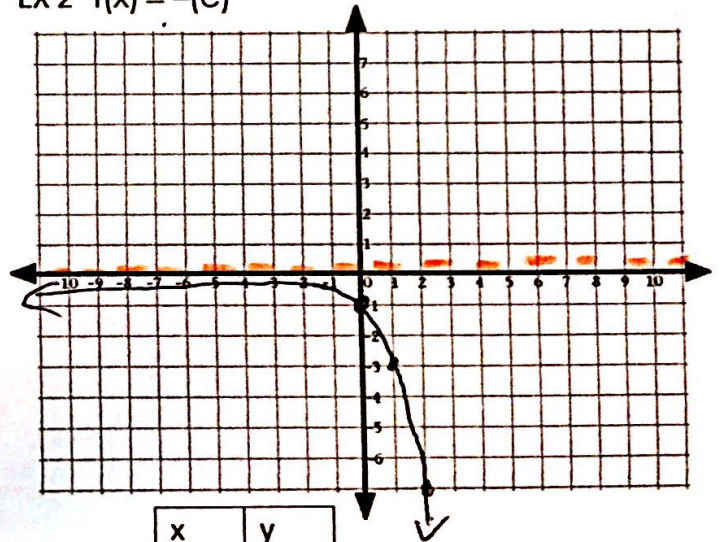
We can graph exponential growth functions with base e.

EX 1 $f(x) = (e)^x + 0$



x	y
0	1
1	2.7
2	7.3
3	20

EX 2 $f(x) = -(e)^x$



x	y
0	-1
1	-2.7
2	-7.3
3	-20

Graphing: Natural Base/ Euler's Number

Graph and analyze the following exponential growth functions. Your graph should accurately show the y-intercept and the asymptote. Determine at least two additional points on the right side of the graph. USE A PENCIL!

1. $f(x) = (e)^{x+2}$

x	f(x)
-2	
-1	
0	
1	
2	

y-intercept _____ asymptote _____

domain _____ range _____

end behavior: as $x \rightarrow +\infty$, $f(x) \rightarrow$ _____, and
as $x \rightarrow -\infty$, $f(x) \rightarrow$ _____

2. $f(x) = (e)^x - 2$

x	f(x)
-2	
-1	
0	
1	
2	

y-intercept _____ asymptote _____

domain _____ range _____

end behavior: as $x \rightarrow +\infty$, $f(x) \rightarrow$ _____, and
as $x \rightarrow -\infty$, $f(x) \rightarrow$ _____

3. $f(x) = (e)^{x-2} + 1$

0 1.13

x	f(x)
1	2
2	3.7
3	8.3
4	21

y-intercept 1.13 asymptote y=1

domain $(-\infty, \infty)$ range $(1, \infty)$

end behavior: as $x \rightarrow +\infty$, $f(x) \rightarrow$ ∞ , and
as $x \rightarrow -\infty$, $f(x) \rightarrow$ 1

4. $f(x) = -(e)^{x+1} + 3$

x	f(x)
1	
2	
3	
4	
5	

y-intercept _____ asymptote _____

domain _____ range _____

end behavior: as $x \rightarrow +\infty$, $f(x) \rightarrow$ _____, and
as $x \rightarrow -\infty$, $f(x) \rightarrow$ _____

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