$$y = \left(1 + \frac{1}{x}\right)^x$$

x	y
10	2.5937
100	2.7048
1000	2.7169
10,000	2.7181

$\downarrow$

e

Base e and Natural Logarithms — 9.5

The natural base, $e = \left(1 + \frac{1}{n}\right)^n$ as $n \to \infty$

$e \to$ natural number $\qquad e \approx 2.7183$

1. $e^2 \approx 7.3891$

2. $e^{-1.3} = \frac{1}{e^{1.3}}$

$\approx .2725$

The logarithm with base e is called the natural logarithm, sometimes denoted by $\log_e x$, but more often abbreviated $\ln x$.

$\ln x = \log_e x$

1. $\ln e = 1$

$\ln e = \log_e e =$

$e^1 = e$

2. $\ln 4$

≈ 1.3863

$\ln 4 = \log_e 4 =$

$e^n = 4$

3. $\ln 0.05$

-2.9957

$\log_b x = y \longleftrightarrow b^y = x$

1. $e^x = 5$

$\log_e 5 = x$

$\ln 5 = x$

2. $e^x = 16 \longrightarrow$

$e^x = 16$

$\log e^x = \log 16$

$x \log e = \log 16$

$x = \frac{\log 16}{\log e}$

$\ln 16 = x$

3. $\ln x \approx 0.6931$

$e^{.6931} = x$

4. $\ln x \approx 0.5352$

$e^{.5352} = x$