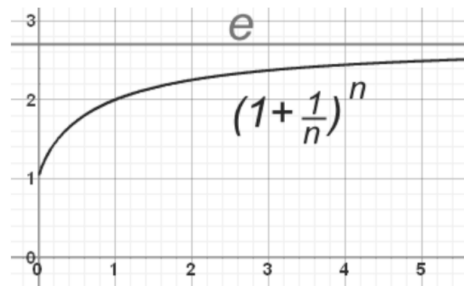


the value of $(1 + 1/n)^n$ approaches e as n gets bigger and bigger:

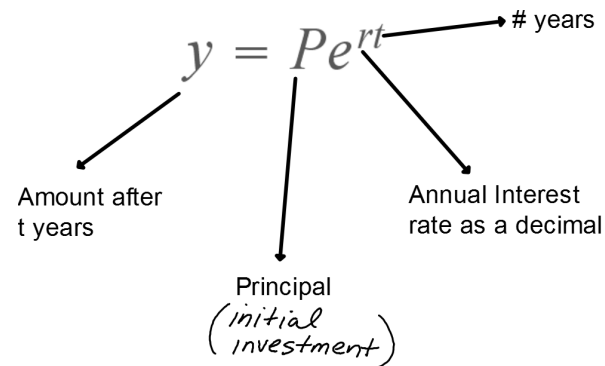


n	$(1 + 1/n)^n$
1	2.00000
2	2.25000
5	2.48832
10	2.59374
100	2.70481
1,000	2.71692
10,000	2.71815
100,000	2.71827 $\approx e$

The more often interest is calculated the more money you will earn.

What is the MOST often that you can calculate interest?
Continuously

Compounding Interest Continuously



You invest \$20,000 in an account that pays 6% annual interest compounded CONTINUOUSLY. How much would you have after 25 years?

$$y = Pe^{rt}$$

$$y = 20,000 e^{.06 \times 25}$$

$$= \$89,633.78$$

Invest \$20,000 at 6% annual interest for 25 years:

with Simple Interest you'll have \$50,000

Compounding annually you'll have \$85,837.41

Compounding monthly you'll have \$89,299.39

Compounding continuously you'll have \$89,633.78

Solve to the nearest hundredth.

1. $6^x = 40$

$$\log_6 40 = x$$
$$x = 2.06$$

2. $e^x = 10$

$$\log_e 10 = x = 2.30$$

or

$$\log_e = \text{LN}$$

also written in lower case:

$$\log_e = \ln$$

log base e is called a:
Natural Logarithm

$$\ln 10 = x = 2.30$$

You invest \$10,000 in an account that pays 5% interest compounded continuously. How many years until you have \$20,000. Round to the nearest hundredth.

$$y = Pe^{rt}$$

$$\frac{20,000}{10,000} = \frac{10,000}{10,000} e^{(.05)t}$$

$$2 = e^{.05t}$$

OR

$$\frac{\log_e 2}{0.05} = \frac{0.05t}{0.05}$$

$$\frac{\ln 2}{0.05} = \frac{0.05t}{0.05}$$

$$t = 13.86 \text{ yrs}$$

You are now ready for the quiz over
Chapter 8

Direct Variation is when x and y have a Constant Ratio.

$$k = \frac{y}{x}$$

The graph of Direct Variation is a line through the origin.

A Direct Variation Equation is: $y = kx$

k is called the variation constant.
It's also the slope of the line. $k = \frac{y}{x}$

Direct Variation: When one quantity increases
the other quantity also increases.

Examples of a Direct Variation relationship:

- The relationship between the number of hours you work and the amount of your paycheck.

$$y = kx$$

\nwarrow \nearrow
 TOTAL paycheck hourly pay (\$/hr) # hrs

- The relationship between the weight of a bucket and the number of gallons of water in it.

$$y = kx$$

\nwarrow \nearrow
 TOTAL wt. of the bucket wt of water (lbs/gal) # gallons

The table below is an example of Direct Variation:

X	Y	$\frac{Y}{X}$
-4	-10	2.5
2	5	2.5
6	15	2.5
14	35	2.5

Variation Constant: $k = 2.5$

Equation: $y = 2.5x$

The table below isn't Direct Variation but has a different relationship between x and y. Can you find this relationship?

X	Y	<u>X · Y</u>
-4	-6	24
1	24	24
2	12	24
3	8	24

X and Y have a constant product.

Inverse Variation is when two quantities have a constant product.

Variation Constant: $k = xy$

An Inverse Variation Equation: $y = \frac{k}{x}$

Inverse Variation: When one quantity increases the other quantity decreases.