

3.1

## Exponential Functions

$$y = a^x$$

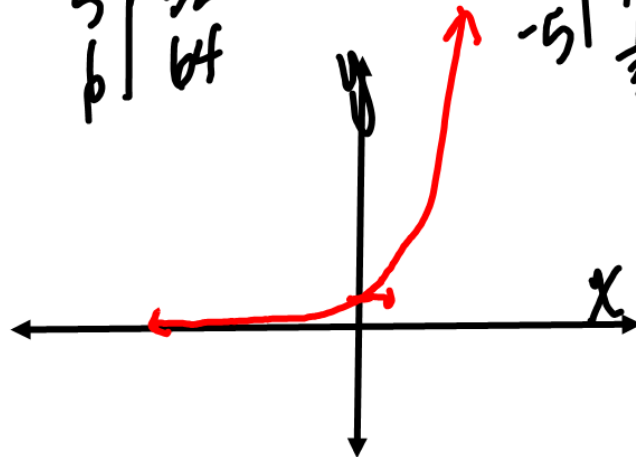
$$y = 2^x$$

x	y
0	1
1	2
2	4
3	8
4	16
5	32
6	64

$$2^0, 2^1, 2^2, 2^3, 2^4$$

x	y
-1	$\frac{1}{2}$
-2	$\frac{1}{4}$
-3	$\frac{1}{8}$
-4	$\frac{1}{16}$
-5	$\frac{1}{32}$

$$2^{-1}, 2^{-2}, 2^{-3}, 2^{-4}, 2^{-5}$$



$$y = \frac{1}{2}^x$$

x	y
0	1
1	$\frac{1}{2}$
2	$\frac{1}{4}$
3	$\frac{1}{8}$

$$\frac{1}{2}^1$$

$$\left(\frac{1}{2}\right)^2$$

$$\left(\frac{1}{2}\right)^3$$

$$\left(\frac{1}{2}\right)^{-1}$$

$$\frac{1}{\frac{1}{2}}$$

$$1 \cdot 2$$

x	y
-1	2
-2	4
-3	8

$$\left(\frac{1}{2}\right)^{-1}$$

$$\left(\frac{1}{2}\right)^{-2}$$

$$\left(\frac{1}{2}\right)^{-2}$$

$$\frac{1}{\left(\frac{1}{2}\right)^2} = \frac{1}{\frac{1}{4}} = 1 \cdot 4 = 4$$

$$y = a^{-x}$$

$$y = 2^{-x}$$

x	y
0	1
1	$\frac{1}{2}$
2	$\frac{1}{4}$
3	$\frac{1}{8}$

$$2^{-1}$$

$$2^{-2}$$

$$2^{-3}$$

x	y
-1	2
-2	4

$$2^{++1}$$

$$2^{- -2}$$

$$y = 2^x + 3$$

$$y = 2 \lambda (x+4)$$

$$y = 2^x$$

$$y = 4^x$$

$$y = 5^x$$

Euler's Number

$e$

Natural Base

$$e \approx 2.72$$

$$y = e^x$$

$$y = 2.72^x$$

# Continuous Compounding

$$A = Pe^{rt}$$

A ending amount

P principal

r interest rate

t time in years

\$ 3,000 invested at 2%

for 8 years compounded

continuously

$$A = Pe^{rt}$$

$$A = 3000 e^{.02(8)}$$

$$A = P \left( 1 + \frac{r}{n} \right)^{nt}$$

A ending amount

P principal

r interest rate decimal

n # of compounding periods in 1 year

n=1 annual

n=2 semi annual

n=4 quarterly

n=12 monthly

t time in years

\$3000 2% monthly 8 yrs

$$A = 3000 \left( 1 + \frac{.02}{12} \right)^{12(8)}$$

$$A = 3000 (1.001667)^{96}$$

$$A = 3000 (1.17335)$$

$$A = 3520.06$$