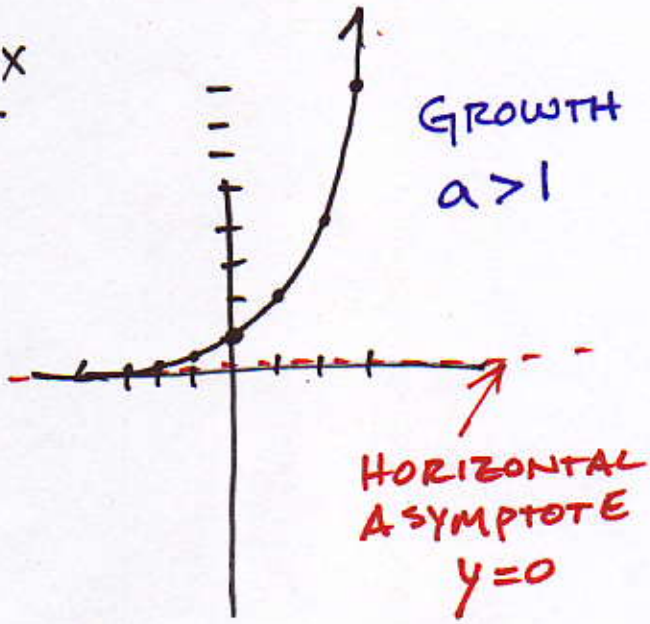
SEC 5.1 EXPONENTIAL FUNCTIONS

EXAMPLE: $f(x) = 2^x$

x	$f(x)$
0	1
1	2
2	4
3	8
4	16
5	32
-1	$1/2$
-2	$1/4$
-3	$1/8$

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

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



DOMAIN: $(-\infty, \infty)$

RANGE: $(0, \infty)$

1. EXPONENTIAL FUNCTION:

$x \leftarrow$ ANY REAL NUMBER

$$f(x) = a^x$$

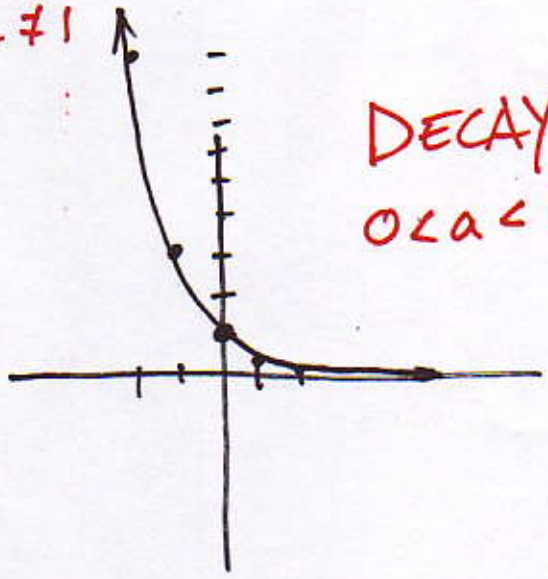
BASE

$a > 0$

$a \neq 1$

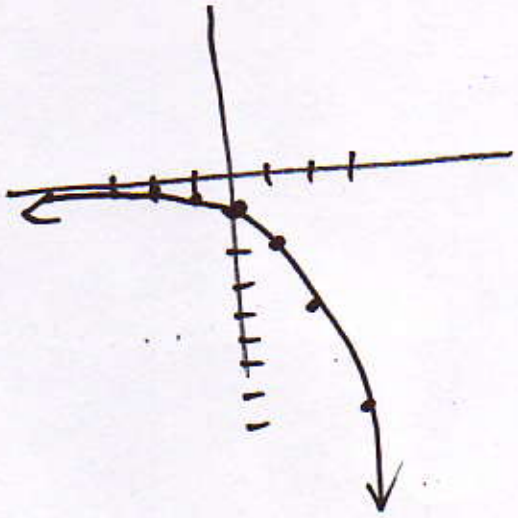
Ex. $f(x) = \left(\frac{1}{3}\right)^x$

x	$f(x)$
0	1
1	$1/3$
2	$1/9$
-1	3
-2	9



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

x	f(x)
0	-1
1	-2
2	-4
3	-8
-1	-1/2
-2	-1/4
-3	-1/8



2. TRANSFORMATIONS APPLY TO EXPONENTIALS

$f(x) + c$ UP c (VERTICAL SHIFT)

$f(x-c)$ RIGHT c (HORIZONTAL SHIFT)

$-f(x)$ REFLECT x-AXIS

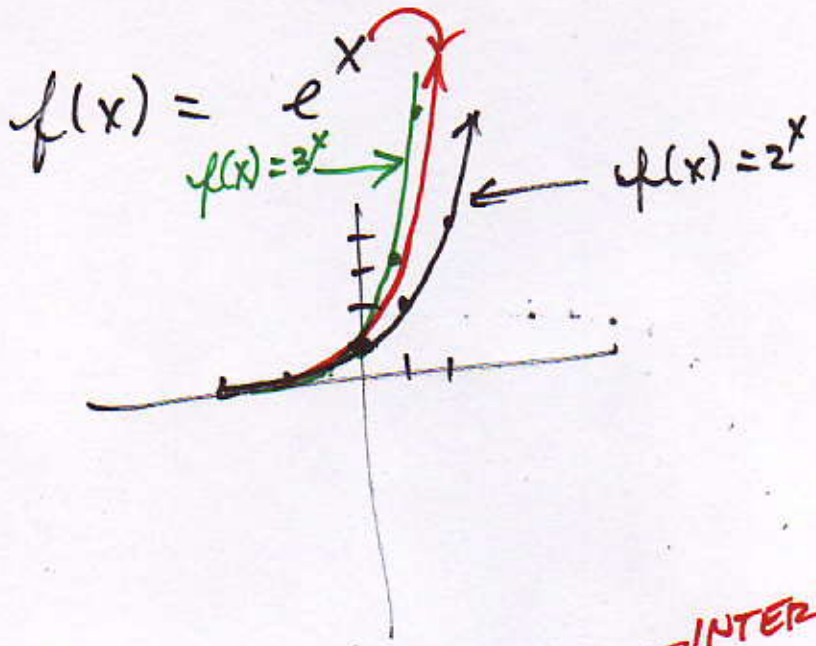
$f(-x)$ " y-AXIS

3. NATURAL NUMBER e

$e \approx 2.718$ (IRRATIONAL #)

$$e = \left(1 + \frac{1}{n}\right)^n$$

n	$(1+\frac{1}{n})^n$
1	2
10	2.59
1000	2.716
100,000	2.718



4. COMPOUND INTEREST

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

- A → AMOUNT
- P → PRINCIPAL
- r → INTEREST RATE
- t → TIME IN YEARS
- n → # OF TIMES $ IS COMPOUNDED PER YEAR

ANNUAL → 1
SEMI-ANNUAL → 2
QUARTERLY → 4
MONTHLY → 12
WEEKLY → 52
DAILY → 365

EX. $A = 1000\left(1 + \frac{.07}{12}\right)^{12(12)}$

$A = 2310.72$

5. CONTINUOUSLY

$$A = Pe^{rt}$$

EX. $A = 1000\,e^{.07(12)}$

$A = 2316.37$