EXPONENTIAL FUNCTIONS

$$y = b^x$$

← variable

← constant #

$b > 0, b \neq 1$

$y = 1^x$

x	y
1	$0^1 = 0$
2	$0^2 = 0$
3	$0^3 = 0$

Exponential
Growth

$$y = b^x$$

$$b > 1$$

Exponential
Decay

$$y = b^{-x} \quad b > 1$$

$$y = b^x \quad 0 < b < 1$$

$$y = \left(\frac{7}{5}\right)^x \quad \text{growth}$$

$$y = \left(0.83\right)^{9-x} \quad \text{growth}$$

$$y = 4^{3-x} \quad \text{decay}$$
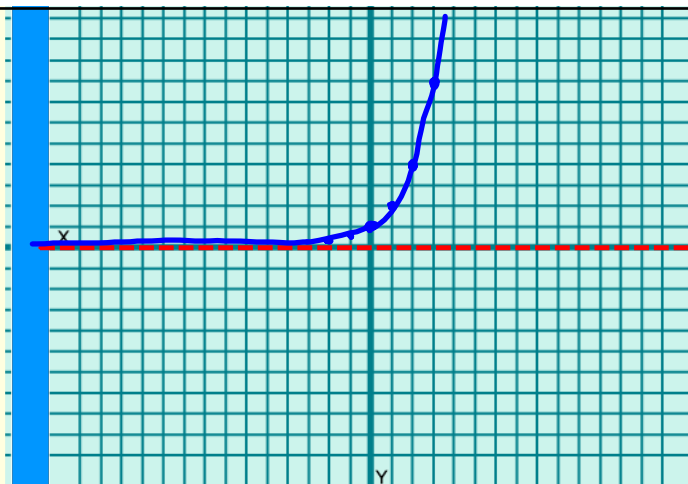
$$y = \left(\frac{1}{3}\right)^{7+x} \quad \text{decay}$$
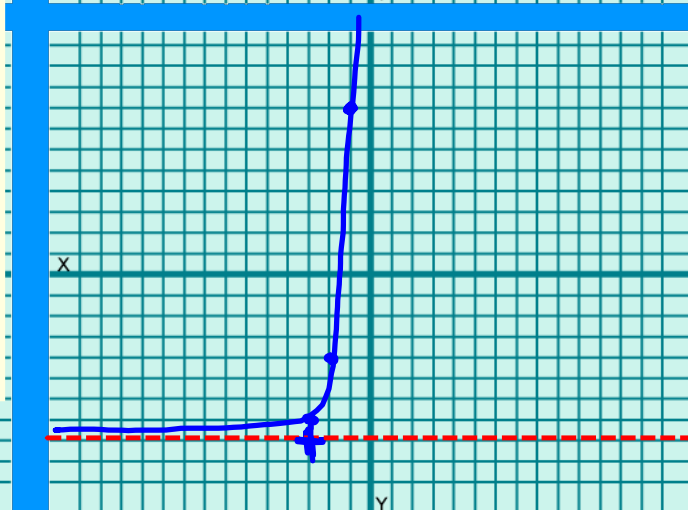
$$y = 2^x$$

$$y = 3^x$$
$$3^0$$

$$y = \frac{1}{3}^x = 3^{-1x}$$

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

$$y = 4^{x+3} - 8$$

← left 3

↑ down 8

$$y = 4^x$$

0	1
1	4
2	16

$$y = (3)\left(2^{\overset{-(x-6)}{6-x}}\right) - 7$$

Right
6

down 7

0	$+$	3
-1	$\times$	6
-2	$+$	12
-3	$\times$	24

$$y = -3^{x-4} + 6$$

Right 4   up 6

0	-1
1	-3
2	-9
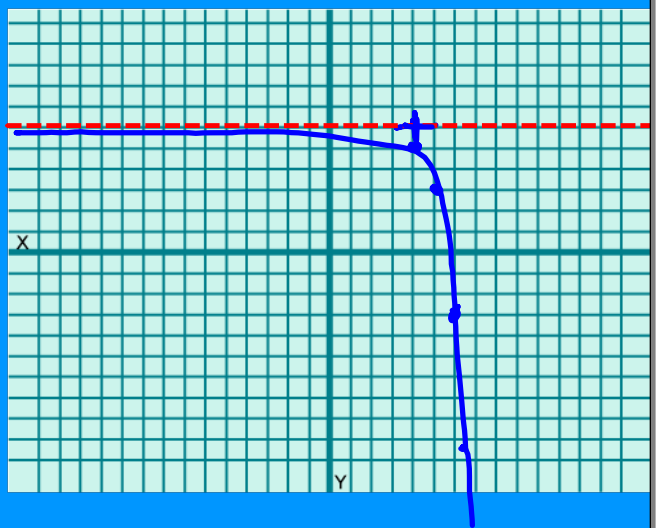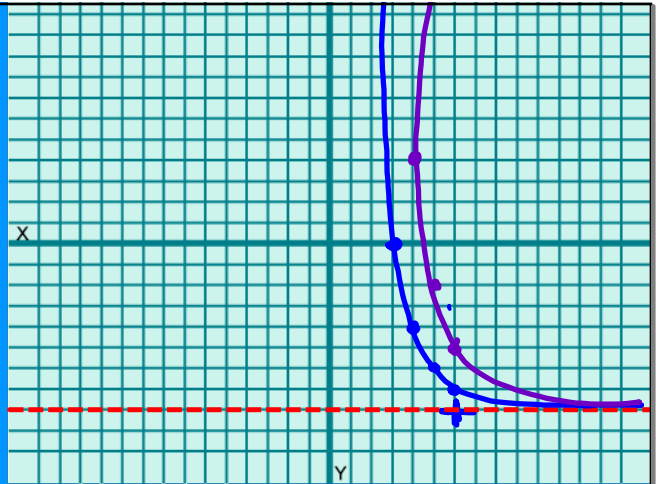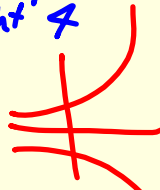
Compound Interest

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

interest rate
time

↑ Final Amt
↑ Principal (start Amt)
↑ # of times compounded in a year

Compounded

monthly $n = 12$
quarterly $n = 4$
Semi-annually $n = 2$
bi monthly $n = 6$
Semi-monthly $n = 24$

Exponential Growth (Man in Control)

$$N = N_0 (1 \pm r)^t$$

↑ Final Amt
↑ Initial Amt
↑ growth/decay rate
time

KSU Tuition

2012 $\$7200$
.076% per year
What is tuition in 2024?

$$N = N_0 (1 \pm r)^t$$
$$N = 7200 (1 + 0.076)^{12}$$
$$N = 7200 (1.076)^{12}$$
$$= \$17,341$$

$$y = 2400 (1.063)^t$$

Grows at 6.3%

$$y = 500 (0.86)^t$$

$$1 - 0.86 = 0.14$$

decay at 14%