Warm-up!

We'll do the quiz first. But then you'll need Desmos for the rest of the lesson. On a computer, tablet, or phone.

A) The price of a certain phone is $\$300$, but every 18 months the price is expected to decrease by 60%. Use a calculator to predict the price of the phone after 2 years (24 months).

B) The number of bacteria in a petri dish is growing exponentially. After 3 minutes, there are nine thousand bacteria in the dish. After 6 minutes there are ten thousand bacteria in the dish. Predict the number of bacteria after 10 minutes.

Exponential Functions Day 5:

- Quiz
- (2.5) Exponential Regression
- Other Calculator Skills

Homework: Exponential Regression and Other Calculator Skills

Below is data reflecting the population of Cairo, Egypt every ten years for the past 70 years. Population is given in millions. Years are given in "years since 1950"

$a(b)^t$

t	0	10	20	30	40	50	60	70
Population	2.5	3.7	5.6	7.3	9.9	13.6	16.9	20.9

Assume that the population of Cairo over this time period may be well modelled by an exponential function. Use a graphing calculator/Desmos to determine a suitable function.

$$y = 2.79746 \cdot 1.03073^x$$

$f(t) = 2.79746(1.03073)^t$

Based on the model, predict the population of Cairo in the year 2015 ($t = 65$).

20.009

Based on the model, predict the value of t corresponding with a population of 8 million.

$t = 34.713$

Below is data reflecting the population of Cairo, Egypt every ten years for the past 70 years. Population is given in millions. Years are given in "years since 1950"

t	0	10	20	30	40	50	60	70
Population	2.5	3.7	5.6	7.3	9.9	13.6	16.9	20.9

Improvements in access to public health resources around 2010 led to a decrease in the death rate in Egypt. By 2020 ($t = 70$), the effect on the population of Cairo became perceptible. Based on this information, how should one restrict the domain of the exponential model we have constructed?

Domain: $0 \le t \le 70$

$f(5)$ $f(63)$ → interpolation

$f(-3)$ $f(79)$ $f(100)$ → extrapolation

Cane toads are an invasive species in Australia. In 1935, there were only 50 female cane toads in Australia, but the population has grown exponentially. Consider the data below where t is years since 1900.

Year	35	40	45	50	55	60	65
Population	50	100	275	785	2210	6230	17560

Use a graphing calculator to construct an exponential model of the cane toad population in Australia as a function of the year.

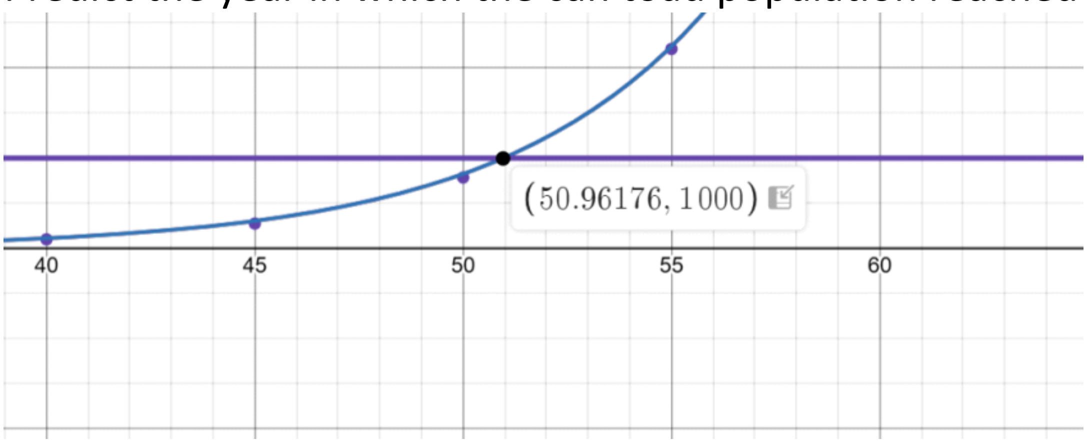
$$y = 0.0383938 \cdot 1.22081^{x}$$

Predict the population of cane toads in Australia in 2000.

$f(100)$

$= 17744709.9004$

Predict the year in which the can toad population reached 1000.



$t = 50.961$

1951

Cane toads are an invasive species in Australia. In 1935, there were only 50 female cane toads in Australia, but the population has grown exponentially. Consider the data below where t is years since 1900.

Year	35	40	45	50	55	60	65
Population	50	100	275	785	2210	6230	17560

Once the Cane Toad population reached 200 million, there was a significant increase in efforts to limit their population growth. Based on this information, predict a reasonable domain restriction for the exponential model constructed on the previous page.