

-Today Solve System of Exponential Equations

-Also start Shrinking Targets from 2.1.1

(Start Ch. 2 with 2.1.2 Day 1 instead of 2.1.1)

*Pull out Shrinking Targets*



Pick up the  
**Warm Up**

(A) List the first 4 terms of a sequence that has an explicit formula of  $t_n = 2(3)^n$

$$t_1 = 2(3)^1 = \underline{6}, \underline{18}, \underline{54}, \underline{162}$$

$$t_2 = 2(3)^2 = 18$$

$$t_3 = 2(3)^3 = 54$$

etc

(B) List the first 4 terms of the sequence given the RECURSIVE formula

$$\begin{aligned} t_2 &= t_1 + 20 \\ &= -100 + 20 = \underline{-80} \end{aligned}$$

$$\begin{cases} t_1 = -100 \\ t_{n+1} = t_n + 20 \end{cases}$$

$$\begin{aligned} t_3 &= t_2 + 20 \\ &= -80 + 20 \end{aligned}$$

$$\underline{-100}, \underline{-80}, \underline{-60}, \underline{-40}$$

# Check Your Solutions

after looking at the solutions, let me know if you want me to go over a problem.

## AGENDA

★ Objective ④ Create an exponential model using a new technique.

③ Shrinking Targets

★ We'll start Ch. 2 on Monday

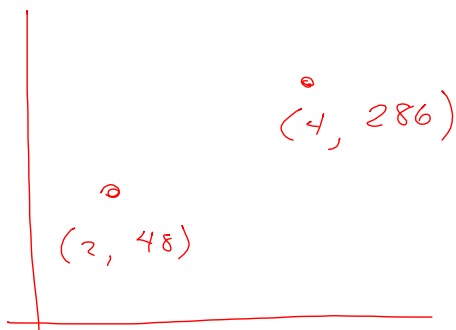
★ Partner  
LCQ

title

Create Exponential  
functions using double  
Substitution

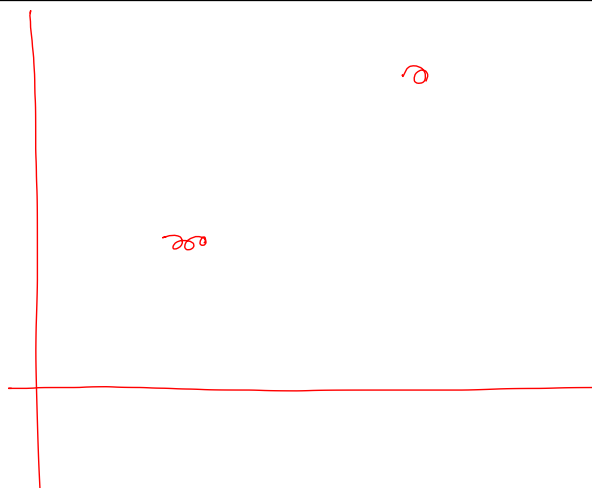
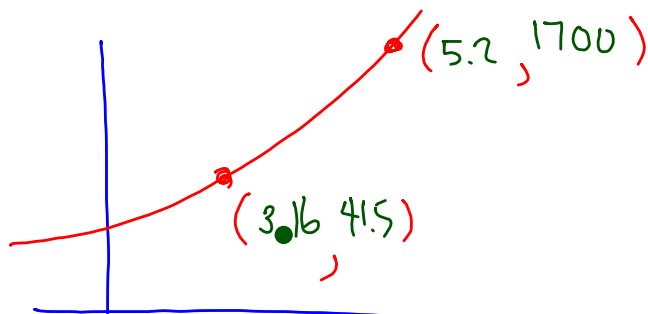


↳ method works on  
many types of  
functions

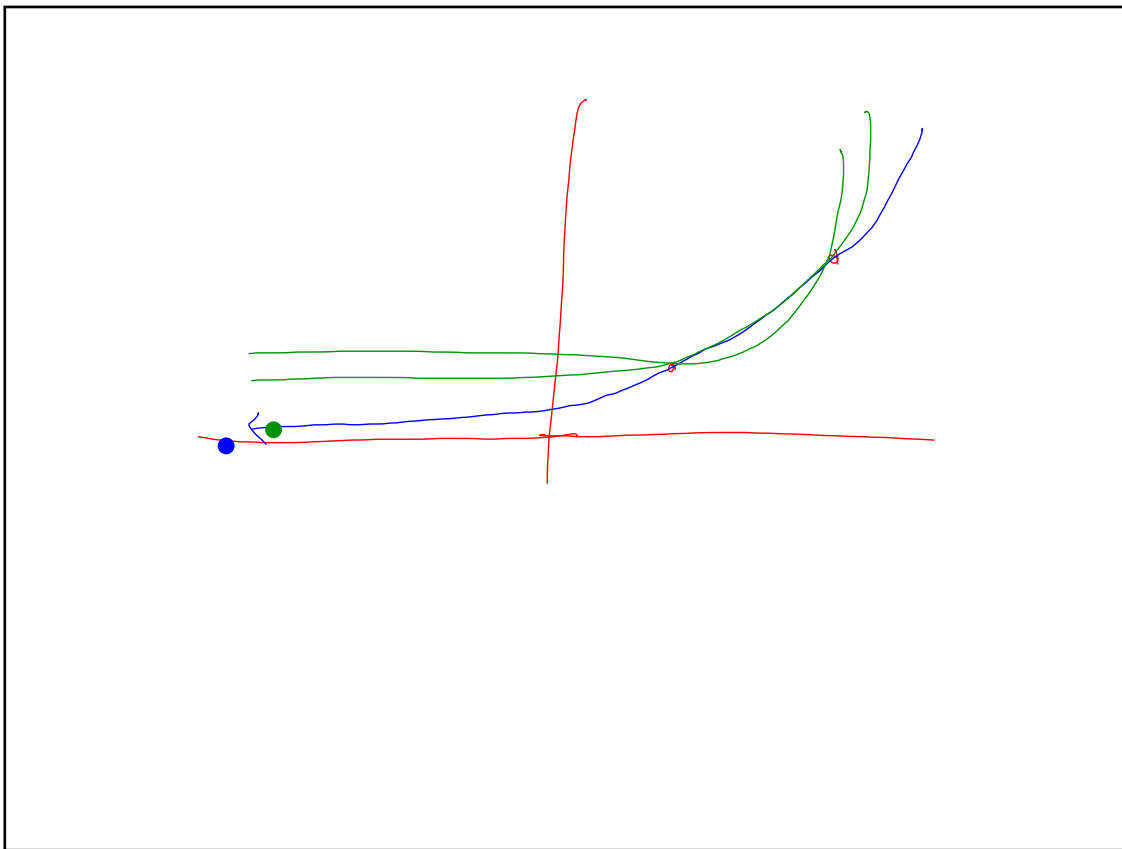


2	24
3	
4	288

What if values  
not so friendly?



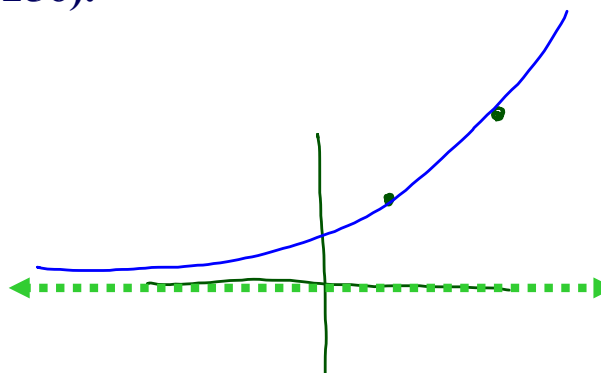
$$y = ab^x$$



Example 1

Solve using the double substitution Method

**Find the equation of an exponential function with an asymptote at  $y = 0$  that passes through the points  $(2, 16)$  and  $(6, 256)$ .**



$(2, 16)$        $(6, 256)$   
 $y = ab^x$        $y = ab^x$   
 $16 = ab^2$        $256 = ab^6$   
 $\frac{16}{b^2} = a$        $\frac{256}{b^6} = a$   
 $a = \frac{16}{b^2}$

method 1 to solve (Substitution)

$256 = \frac{16}{b^2} \cdot b^6$   
 $256 = 16 \cdot b^4$   
 divide  
 $b^4 = 16$   
 $\sqrt[4]{b^4} = \sqrt[4]{16}$   
 $b = 2$

$a = \frac{16}{2^2} = 4$   
 $y = 4(2)^x$

✓

$16 = ab^2$        $256 = ab^6$

2nd method divide one equation by the other

$\frac{256}{16} = \frac{ab^6}{1ab^2}$

$16 = b^4$   
 $b^4 = 16$   
 same from here

$\frac{16}{256} = \frac{ab^2}{ab^6}$   
 $\frac{16}{256} = \frac{1}{b^4}$

a 2<sup>nd</sup>  
teching

$$16 = ab^2$$

$$256 = ab^6$$

Find the equation of the exponential function ( $y = ab^x$ ) that pass through  $(3, 26,568)$  and  $(5, 956,448)$

Example  
2



$(3, 26,568)$  and  $(5, 956,448)$   
 $y = ab^x$        $y = ab^x$   
 $26568 = ab^3$        $956448 = ab^5$   
 $956448 = \frac{ab^5}{ab^3}$   
 $\frac{956448}{26568} = \frac{ab^5}{ab^3}$   
 $b^2 = 36$   
 $b = 6$

$26568 = a(6)^3$   
 $a = \frac{26568}{6^3} = 123$

$y = 123(6)^x$

Two hand-drawn diagrams of a figure-eight shape, each with a small number below it. The left diagram is labeled with a small '6' and the right diagram is labeled with a small '2'.

Everyone title  
your Notes:

Ch. 2

# "Transformations"

Aim

1 View non-linear data,



2 Make a scatter plot of the data



3 "Fit" an equation to that data

$y =$

4 Then, make predictions with the equation.

- ✓ There are 8 circles.... A, B, C, ..... H
- ✓ The mass and radius was measured for each one.

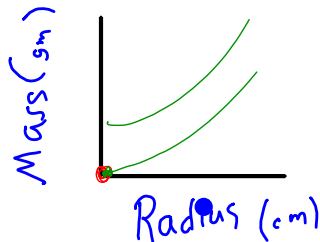
With the data from all 8 circles, each of you should

- a) make a table.  
with headings

radius (cm)	mass (g)

include axis labels

- b) Do not graph, Instead **predict** the graph  
(in a 15 second sketch)



- c) What should the x and y intercepts be?

radius (cm)	mass (grams)
2.5	
2.75	
3.6	
5.0	
5.8	
6.5	
7.5	
8.2	

★

rad (cm)	mass (g)
2.5	1.7
2.75	2
3.6	3
5	5.8
5.8	8.0
6.5	12
7.5	11
8.2	16

$y = .24x^2$

$.24(20)^2 = 96$

Guesses for the mass of a plate with a radius of 20 cm?

30  
38  
40  
23.2

## Graph the data using a Graphing Calculator

- Clear out old data (if any)
- Enter the new data
- Create a scatter plot
  
- Decide the best type of function to use to model the data

can use the Graphing Calculator Instructions

What type of function?

The Mass depends on  $\pi r^2$   
 $\pi x^2$

suggests a quadratic

$$y = x^2$$

Make adjustments to your equation to "fit" to the data.  $y = x^2$

**Write down your final equation.**

Use it to predict the mass of a target with a radius twice as large as the largest circle (circle A)

**Now determine the mass of a plate with a radius of 20 cm.**

Partner  
LCQ

Assignment

Appendix **B**....53ab, 73, 89, and 94

and <sup>ch. 2</sup> **2**.... 6 and 9

(Use method  
from class today)

from Class

September 29, 2017

