-Today Solve System of Exponential Equations using Double Substitution

Short day today so..... the warm up is short!

HW Help

determine an explicit formula for the following sequence and then use it to find the 1000th term

$-198, -188, -178, -168, \ldots$

Reminder: The Quiz on the "Appendix" items will be next Tuesday, not tomorrow.

Tomorrow, we start Ch. 2

determine an explicit formula for the following sequence and then use it to find the 1000^{th} term

$-198, -188, -178, -168, \ldots\ldots$

$t_n =$

$t_{100} =$

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$-198, -188, -178, -168, \ldots\ldots$

arithmetic with common difference of $d = 10$

$t_n = -198 + 10(n-1)$ or $t_n = -208 + 10n$

$t_{100} =$

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arithmetic with common difference of $d = 10$

$t_n = -198 + 10(n-1)$ or $t_n = -208 + 10n$

$t_{100} = -198 + 10(1000 - 1) = 9792$

HW Help?

Short day - so just a few

A-100

a) 3% increase

b) 25% decrease

c) 13% decrease

d) 208% increase

A

121 b

$4x + 5y = 11$

$2x + 6y = 16$ $\times -2$

$4x + 5y = 11$

$-4x - 12y = -32$

$-7y = -21$

$y = 3$

A-123 c

$$\frac{2(3x)^2}{3x^3}$$

123 d

$$\frac{2(3x)^2}{(3x)^{-2}}$$

B-35

a)

-1	3
0	
1	75
2	
3	

b)

0	
1	
2	96.64
3	72.312
4	

B-48

a) $(x-3)^2$

b) $(2m+1)^2$

c) $x(x-3)(x+1)$

d) $(2y-1)(y^2+7)$

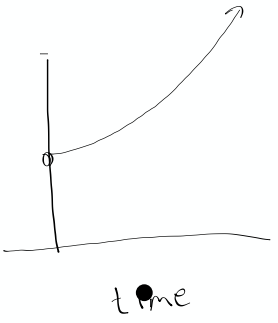
B-61 Grandparents → ₦500 in an account growing at 8%

a) function ✓

b) after 16th birthday ✓

c) domain :

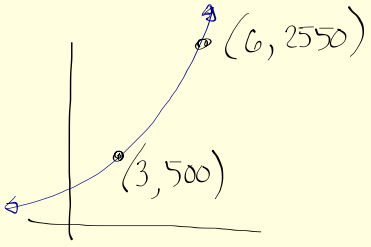
range



B. 64 d $|x-3|+5=11$

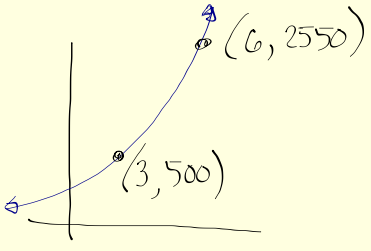
B 48 d) $(2y-1)(y^2+7)$

Yesterday



You created exponential functions ($y = ab^x$)

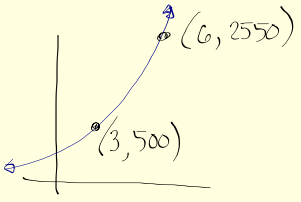
Yesterday



You created exponential functions ($y = ab^x$)

How ?

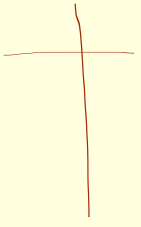
Yesterday



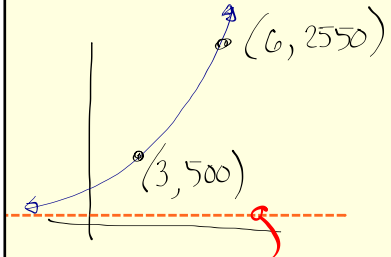
You created exponential functions ($y = ab^x$)

How ?

the values were so friendly We could pretend they were part of a sequence



Yesterday



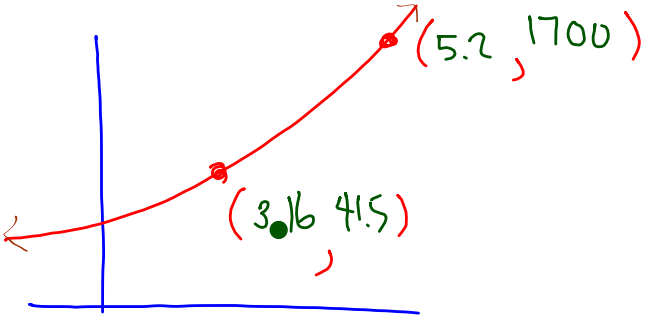
the method only works if $y=0$ is the asymptote

You created exponential functions ($y = ab^x$)

How ?

the values were so friendly We could pretend they were part of a sequence

What if values are not so friendly?



or $y=0$ is not the HA?

Aim today:

Create Exponential functions using double Substitution

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) and (6, 256)

$y = ab^x$ $y = ab^x$

$16 = ab^2$ $256 = ab^6$

$a = \frac{16}{b^2}$

$256 = \left(\frac{16}{b^2}\right)b^6$

$256 = 16b^4$

$b^4 = \frac{256}{16}$

$b = \sqrt[4]{\frac{256}{16}}$

$b = 2$

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

$= 4$

$y = 4(2)^x$

$256 = (16/b^2)b^6$

How did we know it was a growth or decay situation?

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) and (6, 256)

$y = ab^x$ $y = ab^x$

$16 = ab^2$ $256 = ab^6$

Did anyone start by solving for the other "a" ?

(2, 16) and (6, 256)

$y = ab^x$ $y = ab^x$

$16 = ab^2$ $256 = ab^6$

$a = \frac{256}{b^6}$

$16 = \left(\frac{256}{b^6}\right) b^2$

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

We need an example where the numbers are not so friendly and

will require you to be a bit more careful when to use your calculator

Example 2

$(2, 204.8)$ $(6, 3125)$ $\rightarrow$ $y = ab^x$

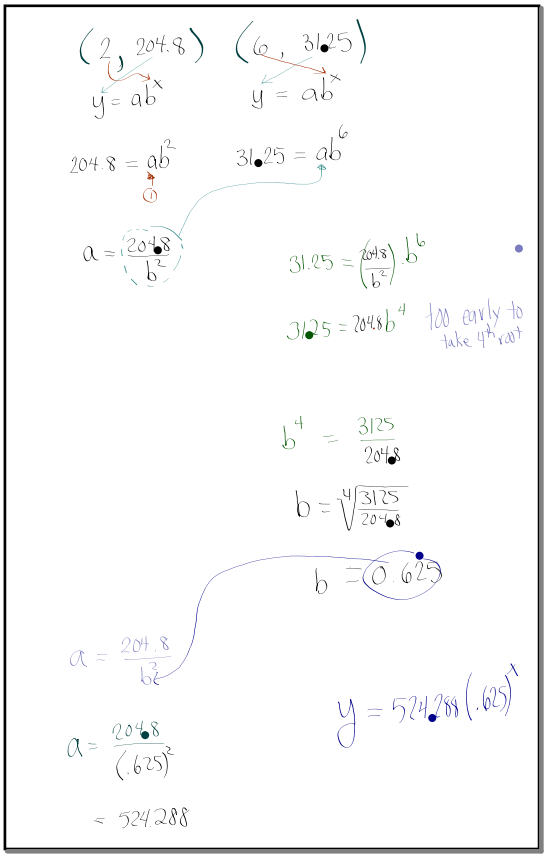
$(2, 204.8)$ $(6, 31.25)$

$y = ab^x$ $y = ab^x$

$204.8 = ab^2$ $31.25 = ab^6$

(1)

$a = \frac{204.8}{b^2}$

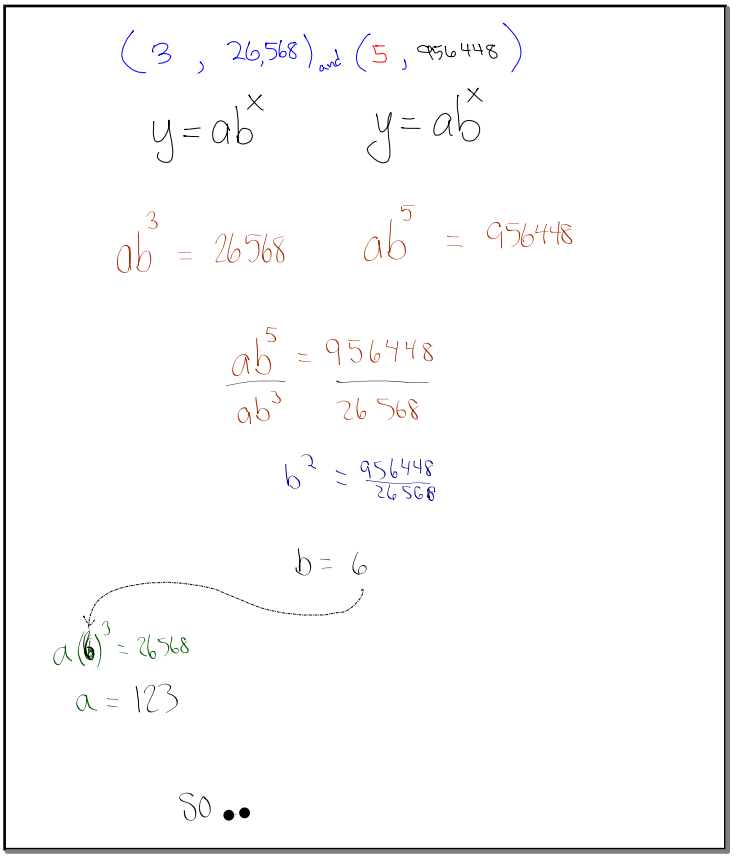


$$y = 524.288\,(0.625)^{x}$$

$(3, 26{,}568)$ and $(5, 956448)$

$y = ab^{x}$ $\qquad$ $y = ab^{x}$

$ab^{3} = 26568$ $\qquad$ $ab^{5} = 956448$


(3, 26,568) and (5, 956448)
$y = ab^x$
$y = ab^x$
$ab^3 = 26568$
$ab^5 = 956448$
$\frac{ab^5}{ab^3} = \frac{956448}{26568}$
$b^2 = \frac{956448}{26568}$
$b = 6$
$a(6)^3 = 26568$
$a = 123$
So ..

Hot Potato

HOT POTATO

- Each group gets one paper and one pencil
- One person starts with both.
- All other members can speak but cannot use their hands.
- You will be prompted when to rotate.
- When you finish, write your answer below your work and circle it. Then show Mr. C.
- If incorrect, find your mistake and continue as before.

First problem

(3, 26568) and (6, 956448)

Use double substit.

$y = ab^x$

form

exact values only

$y = 123(6)^x$

2nd problem

(5, 320) (10, 10240)

Start with a diff. person

Let's Summarize

the last 2 days

Summary

Creating Expon Functions through 2 given points

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Use $f(x) = ab^x$ format if horiz asymptote is $y = 0$

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Creating Expon Functions through 2 given points

Use $f(x) = ab^x$ format if horiz asymptote is $y = 0$

If given values are simple	Given values not simple or the asymptote is not $y = 0$

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Creating Expon Functions through 2 given points

Use $f(x) = ab^x$ format if horiz asymptote is $y = 0$

If given values are simple	Given values not simple or the asymptote is not $y = 0$
determine the multiplier by writing a simple equation 1 | ___ 2 3 4 or from $-, \frac{4}{-}, -, \frac{16}{-}$	

Summary

Creating Expon Functions through 2 given points

Use $f(x) = ab^x$ format if horiz asymptote is $y = 0$

If given values are simple

determine the multiplier by writing a simple equation

1	
2	
3	
4	

or from $-, \frac{4}{-}, -, \frac{16}{-}$

Given values not simple or the asymptote is not $y = 0$

Use double substitution method.

(x, y) (x, y)

$y = ab^x$ $y = ab^x$

Shortcut ?

$ab^3 = 26568$ $ab^5 = 956448$

Assignment

Appendix B....53ab, 71, 89, 94a, 97

(Use method from class today)

Next Tuesday, the last half of the period, there will be a quiz on the Appendix Topics

Sequences (both explicit and recursive formulas), exponential functions, exponents