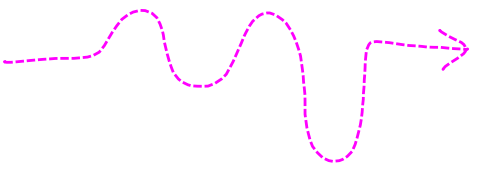
Questions on Homework



pick up
Warm up

warm Up

With each function: underline if its a linear function, circle if its an exponential function and leave blank if it is neither

1

$f(x) = 5(2)^x$ $f(x) = 3x^2$ $f(x) = 3x-2$ $f(x) = 3\left(\frac{1}{4}\right)^x$

$f(x) = 3+5(x-1)$ $f(x) = 1.2^x$ $f(x) = 3(1)^x$ $y = 7x$

trick

$1^3 = 1$ $1^5 = 1$

$1^2 = 1$

$100\% - 30\% = 70\% = .7$

(2)

A bacteria decays at a rate of 30% per hour. If there are 2000 bacteria to start with:

a) Write an equation that will represent the number after *t* ~~years~~ hours

$y = 2000(.7)^x$ $y = 2000(.7)^t$

b) How much will be left in 8 hours ?

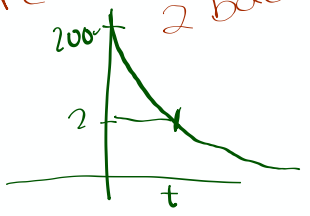
$y = 2000(.7)^8 =$ ~~150~~ 115.3 bacteria

c) Approximately, when will there be only 2 bacteria left ?

$2 = 2000(.7)^t$

Y_1 Y_2

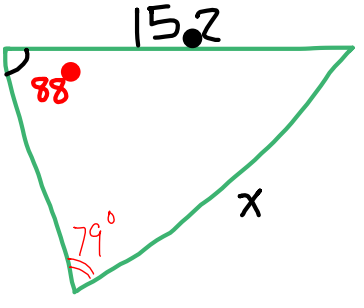
In 19.4 hours there will be 2 bacteria



$y = ab^x$

$y = b^x$

Solve for x



Check HW

Today's Goal:

1. Write recursive formulas for sequences.

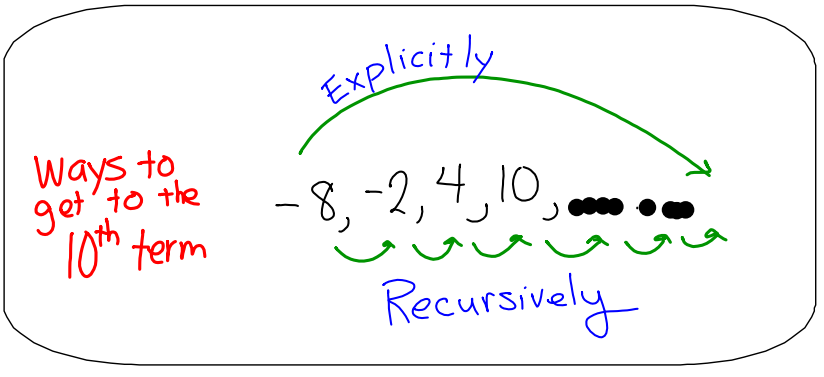
2. Exponential Function Basics

occur

recur

recursive

Explicit **formulas can generate any term in the sequence.**



Recursive formulas show how to produce *the next term* <u>from</u> a *known term*.

What is the sequence doing over and over again?

Recursive formulas

are used in computer programming

Notation

t(n) or t_n the current term or term of interest

t(n+1) or t_{n+1} the next term after that term

t(n-1) or t_{n-1} preceeding term

Pick up the handout

Question #1 **Write a sequence formula for each:**

t_n t_{n+1}

explicit formulas — Zero or first term format

recursive formula

20, 23, 26, 29.....

$t_n = 20 + 3(n-1)$

$$\begin{cases} t_1 = 20 \\ t_{n+1} = t_n + 3 \end{cases}$$

45, 40, 35, 30.....

$t_n = 45 - 5(n-1)$

$$\begin{cases} t_1 = 45 \\ t_{n+1} = t_n - 5 \end{cases}$$

6, 12, 24, 48,..... $t_n = 6(2)^{n-1}$ $\begin{cases} t_1 = 6 \\ t_{n+1} = 2t_n \end{cases}$

90, 30, 10, ... $t_n = 90\left(\frac{1}{3}\right)^{n-1}$ $\begin{cases} t_1 = 90 \\ t_{n+1} = \frac{1}{3}t_n \end{cases}$

Question #2

In a new sequence, what does the following mean? $t(32) = 1800$

the 32nd term is 1800 $t_{32} = 1800$

Question #3

Determine whether **530** is a term of the sequence $t(n) = 8 + 6n$

$530 = 8 + 6n$

$522 = 6n$

$n = 87$

So, 530 is a term of the sequence

Question #4

Given the recursive sequence below, list the first 5 terms of the sequence

$$t_1 = 3$$
$$t_{n+1} = 5\,t_n - 1$$

3 (1) t_1 | 14 (2) t_2 | 69 (3) | 344 (4) | 1,719 (5)

$n=1$ $t_2 = 5(3) - 1 = 14$

$n=2$ $t_3 = 5(14) - 1 = 69$

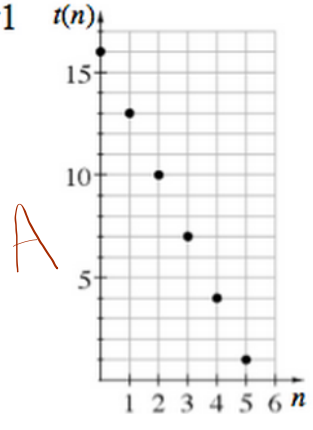
$n=3$ $t_4 = 5(69) - 1 =$

$t_5 = 5(344) - 1 =$

Question #5

Write the first few terms of each sequence. Then identify each sequence as arithmetic, geometric or neither.

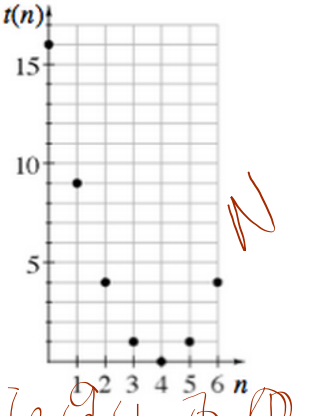
#1



A

16 (0) 13 (1) 10 7 4

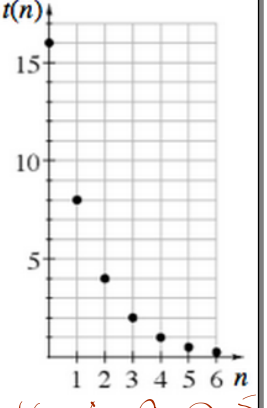
#2



N

16 9 4 0 0

#3



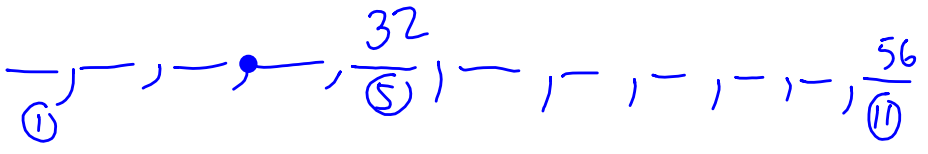
C

16 (0) 8 (1) 9 2 5

Question #6 **Mystery sequence**

clues: $t(5) = 32$ and $t(11) = 56$

find the arithmetic sequence



Consider taping these notes into yours.

NOTES

Exponential Functions

Appendix B

Pull out your Reference Sheet

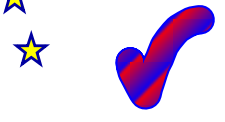
Exponential functions in this form

$$y = ab^x$$

a: multiplier

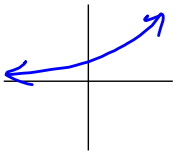
are only defined when:

$b > 0$ $b \neq 1$

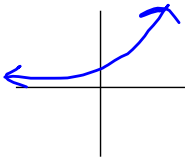


Get your GDC ready

$y = 1(2)^x$



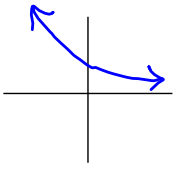
$y = 1(1.23)^x$



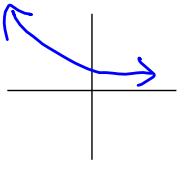
Exponential Growth when

$b > 1$

$y = 1(0.35)^x$

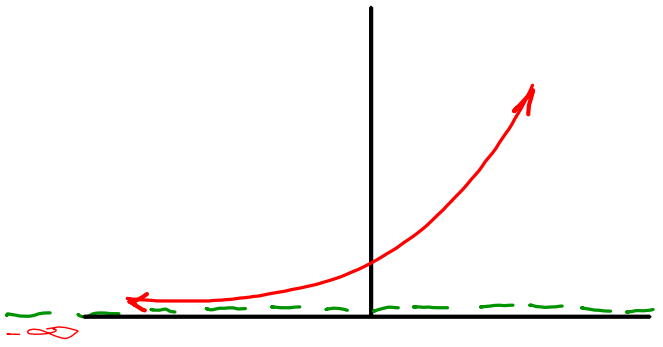


$y = 1\left(\frac{2}{3}\right)^x$



Exponential Decay

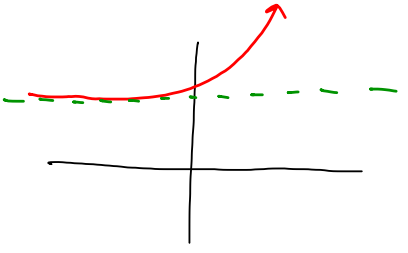
$0 < b < 1$



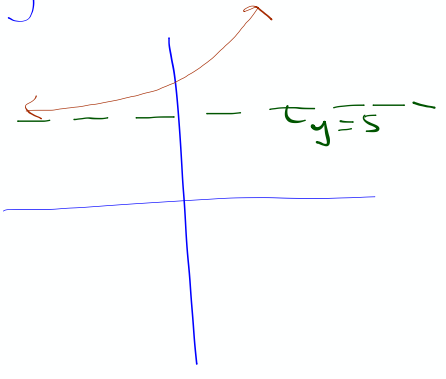
HORIZONTAL ASYMPTOTE
graph approaches but never touches

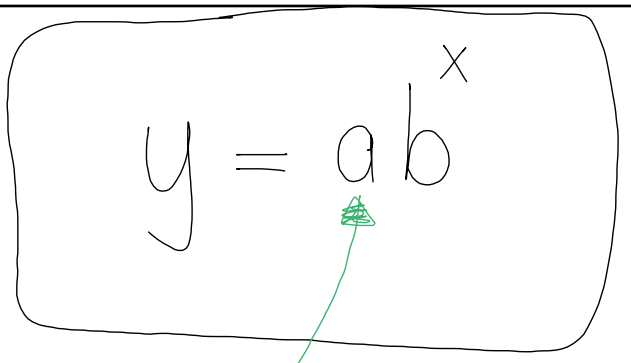
Domain $-\infty < x < \infty$

Range $0 < y < \infty$



$y = 2^x + 5$



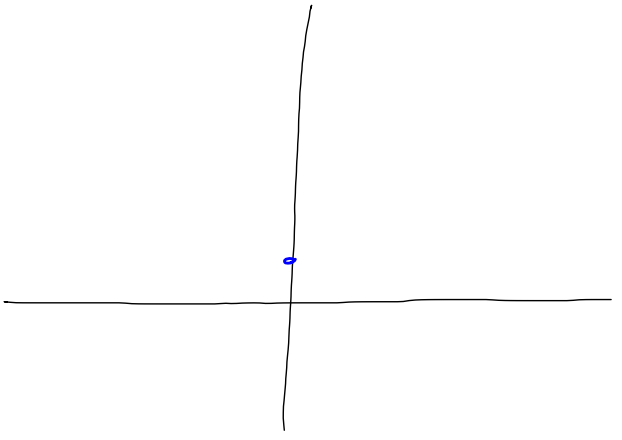


→ initial value of an exponential situation

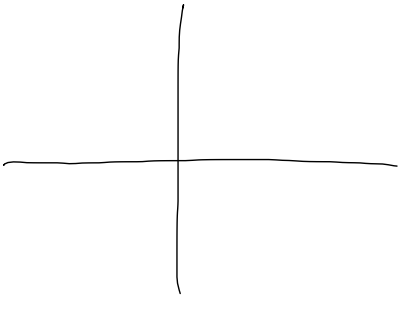
→ y-intercept of its graph

but
not all exponentials
are basic

Sketch $y = 2(3)^x + 5$



★ Sketch $y = 8\left(\frac{2}{3}\right)^x - 4$



Find the y-intercept analytically.

$y = 3(2)^x$

Graph and find the y-intercept.

Some common issues I noticed on the test

anyone need to leave? (have not taken test)

$(x-4)^2 = 25$

↓

NOT

$x^2 - 16 = 25$

$(6)^2 \quad (-6)^2 \quad -(6)^2 \quad -6^2$

$\frac{-4}{10}$ $\frac{4}{-10}$ $-\frac{4}{10}$ ●●› $-\frac{2}{5}$ best

NO "CUTSY Fractions

$-4/10$

what happens if you multiply by 2

$(-4/10)\,2$

$\left(\frac{-4}{10}\right)2$

Solve for n

$$m = \sqrt{n+3}$$

Subject ends up on the left

So many made this too hard !!!

5. Calculate both the x- and y- intercepts for $2x + 3y = 6$ *and show how this can be done using algebra for full credit* (*other methods partial credit*)

Set $x = 0$

$2(0) + 3y = 6$

$3y = 6$

$y = 2$

√√ y-intercept: $(0, 2)$

Set $y = 0$

$2x + 3(0) = 6$

$2x = 6$

$x = 3$

√√ x-intercept(s): $(3, 0)$

Seeing your test:

✓ = 1 mark

✓✓ = 2 marks

✓✓✓ = 3 marks

✓✓✓✓ = 4 marks

etc

SS = See the Solutions

F.T. You did the correct thing on this problem even though you used the incorrect answer from the previous problem.
(So I am not marking this problem wrong)

Assignment Appendix

A....24, 56, 78, 83, 99, 100

Exponent Review

Boot camp

Manipulating Powers

Exponent LAWS (Add to your notes)

1) $(a^x)^y = a^{xy}$	4) $(ab)^x = a^x b^x$	7) $\frac{1}{a^{-x}} = a^x$
2) $a^x \cdot a^y = a^{x+y}$	5) $\left(\frac{a}{b}\right)^x = \frac{a^x}{b^x}$	
3) $\frac{a^x}{a^y} = a^{x-y}$	6) $a^{-x} = \frac{1}{a^x}$	

Handout

Manipulating Powers

Exponent LAWS (add to your notes)

1) $(a^x)^y = a^{xy}$	4) $(ab)^x = a^x b^x$	7) $\frac{1}{a^{-x}} = a^x$
2) $a^x \cdot a^y = a^{x+y}$	5) $\left(\frac{a}{b}\right)^x = \frac{a^x}{b^x}$	
3) $\frac{a^x}{a^y} = a^{x-y}$	6) $a^{-x} = \frac{1}{a^x}$	

Simplify each expression.

Example: $(x^2)^4 = x^{2 \cdot 4} = x^8$

1. $x^4 \cdot x^2$ use the 2nd law $= x^6$

2. $\frac{x^8}{x^6} = x^2$

3. $(x^2y)^3 = (x^2)^3 \cdot y^3 = x^6y^3$

$(x^2)^3$

4. $\left(\frac{x}{y^3}\right)^5 = \frac{x^5}{y^{15}}$

$\frac{x^5}{(x^3)^5}$

5. $y^{-15} = \frac{1}{y^{15}}$

6. $\frac{1}{x^{-15}} = \frac{x^{15}}{1} = x^{15}$

7. $\frac{a^6}{a^9} \; a^3 = \frac{1}{a^3}$

8. $(2c^2)^3$

$2^3 \cdot (c^2)^3 = \boxed{8c^6}$

9. $\frac{n^4 \cdot n^6 \cdot n^4}{n^8 \cdot n^2} = \frac{n^{10}}{n^{10}} = \boxed{1}$

10. $4a^5 \cdot 3a^3$

$\boxed{12a^8}$

11. $\left(\frac{v}{3}\right)^4 \cdot \left(\frac{5}{v}\right)^2$

$\frac{v^2 v^4}{3^4} \cdot \frac{25}{v^2}$

$= \boxed{\frac{25v^2}{81}}$

12. $(x^{-2})^2$

x^{-4}

$= \boxed{\frac{1}{x^4}}$

13. $\left(\frac{2}{x}\right)^{-1}$

$\frac{x}{2}$