Warm Up 4/1/19

Pick up from the stool

1. What is the y-intercept of the following graphs:

A) $y = 3\,(1/2)^x + 7$ (0,10) $y = a(b)^x$

B) $y = 5(1/5)^x$ (0,5)

C) $y = -2(4)^x + 10$ (0,8)

D) $y = -8(2/7)^x$ (0,-8)

2. The rule for a geometric sequence is $a_n = 102(1/3)^{n-1}$

What is the fifth term in the sequence? $a_n = a_1(r)^{n-1}$

$a_5 = 102\left(\frac{1}{3}\right)^{5-1}$

$= 102(1/3)^4$

$= \frac{34}{27}$

102, 34, $\frac{34}{3}$, $\frac{34}{9}$, $\frac{34}{27}$

3. A town's population increases at a rate of 2% every year. The current population is 6,500 people. What equation would represent this scenario?

r, a

2% → 0.02

$y = 6500(1+r)^t$

$y = 6500(1.02)^t$

Exponential Regression

On the Calculator:

1. Put your data into L_1 & L_2
(STAT) (ENTER)

2. Calculate Exponential Regression
(STAT) (CALC) (0) (ENTER)

3. ExpReg
$y=a*b^x$
a = _____ (Initial value)
b= _____ (Growth/Decay Factor)

Practice Tables: Find the equation for each of the following tables

$y = -\frac{1}{2}(2)^x$

x	y
0	$-\frac{1}{2}$
1	-1
2	-2
3	-4
4	-8
5	-16

$y = \frac{8}{5}\left(\frac{5}{2}\right)^x$

x	y
1	4
2	10
3	25
4	62.5
5	156.25

$y = 243\left(\frac{1}{3}\right)^x$

x	y
1	81
2	27
3	9
4	3
5	1

On your own..... find the equation that represents each table

X	0	1	2	3	4
F(x)	5	15	45	135	405

$y = 5(3)^x$

X	3	4	5	6	7
F(x)	13.5	20.25	30.375	45.5625	68.34375

$y = 4(1.5)^x$

X	2	4	6	7	9
F(x)	96	1536	24576	98304	1572864

$y = 6(4)^x$

Word Problem Practice

Fido did not have fleas when his owners took him to the kennel. The number of fleas on Fido after he returned from the kennel grew according to the equation $f = 8(3^n)$, where f is the number of fleas and n is the number of weeks since he returned from the kennel. (Fido left the kennel at week 0.)

a. How many fleas did Fido pick up at the kennel? (0,8) → 8 fleas

b. What is the growth factor for the number of fleas? 3 per wk

c. How many fleas will Fido have after 10 weeks if he is not treated?

$f = 8(3)^{10}$

472,392 fleas

Exponent Rules

$\frac{5^4}{5^3} = 5^1 = 5$

$6^3(6^2) = 6^5$

6^6

6^1

36^6

36^5

$\frac{625}{125} = 5$

$6^3 = 216$

$6^2 = 36$

$6^5 = 7776$

$6^6 =$

7,776

$x^{-n} = \frac{1}{x^n}$

$5^{-2} = 0$

25

$\frac{1}{25}$

5

0.04

$5^2 = 25$

$5^{-2} = \frac{1}{25}$

$3^2 = 9$

$3^{-2} = \frac{1}{9}$

$2^0 = 1$

$(2x^4y^5z^6)^0 = 1$

$(2^3)^2 = 2^6$

$(8)^2 = 64$

4^6

8^2

Exponent Rules

- To multiply powers with the same base, add the exponents.

$a^m \cdot a^n = a^{m+n}$ For example, $4^5 \cdot 4^3 = 4^{5+3} = 4^8$.

- To divide powers with the same base, subtract the exponents.

$\frac{a^m}{a^n} = a^{m-n}$ For example, $\frac{4^5}{4^3} = 4^{5-3} = 4^2$.

- Any base raised to the power of 0 is equal to 1.

  $a^0 = 1$ For example, $4^0 = 1$.

- To raise one power to another power, multiply the exponents.

  $(a^m)^n = a^{m \cdot n}$ For example, $(4^5)^3 = 4^{5 \cdot 3} = 4^{15}$.

- To find the power of a product, distribute the exponents.

  $(ab)^m = a^m \bullet b^m$ For example, $(4 \bullet 5)^3 = 4^3 \bullet 5^3$.

- To find the power of a quotient, distribute the exponents.

$$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$$ For example, $\left(\frac{4}{7}\right)^5 = \frac{4^5}{7^5}$.

Negative Exponents

- It is not proper to leave a negative exponent in an expression. To make a negative exponent positive, take the reciprocal of the power.

$$a^{-m} = \frac{1}{a^m};\ a \neq 0$$ For example, $4^{-5} = \frac{1}{4^5}$.

Simplify the expression $x^{-3} \cdot y^{0} \cdot z^{-4} \cdot x^{5}$. Write the expression using only positive exponents.