Name: ______________ HW: Exponential & linear

Determine whether the following scenarios would be best modeled using a linear or exponential model. Then, write an equation.

1.
- Ms. Hunter takes off 10 points for each day an assignment is turned in late. The assignments are worth 100 points each.

  linear $y = -10x + 100$

- There are 200 ladybugs in a certain population. The population is decreasing by 14% per day. EXP

  $y = 200(1-14\%)^x$

- Your salary starts at \$23000 and goes up by 5% per year. EXP

  $y = 23000(1+5\%)^x$

- A painter is going to charge \$90 for paint and \$35 an hour to paint your kitchen.

  linear $y = 35x + 90$

2. **Given the situations below, identify if it is a linear or exponential model or neither. Explain your reasoning.**

   a. A savings account that starts with \$5000 and receives a deposit of \$825 per month.

   linear $y = 825x + 5000$

   b. The value of a house that starts at \$150,000 and increases by 1.5% per year.

   EXP $y = 150{,}000(1+1.5\%)^x$

   c. Tina owns 4 rabbits. She expects them to double each year.

   EXP $y = 4(2)^x$

   d. The cost of operating Jelly's Doughnuts is \$1600 per week plus \$.10 to make each doughnut.

   linear $y = .10x + 1600$

   e. The value of John's car that depreciates 20% per year

   Expon

   f. The height of a ball that is thrown in the air u shape so quadratic

   Neither

3. Which situation could be modeled with an exponential function?

   (1) the amount of money in Suzy's piggy bank which she adds \$10 to each week
   (2) the amount of money in a certificate of deposit that gets 4% interest each year
   (3) the amount of money in a savings account where \$150 is deducted every month
   (4) the amount of money in Jaclyn's wallet which increases and decreases by a different amount each week

Part II – Exponential Growth & Decay Applications

4. The rent for an apartment was $6,600 per year in 2012. If the rent increased at a rate of 4% each year thereafter, use an exponential equation to find the rent of the apartment in 2017.

$6600(1+4\%)^5 = \$8029.91$

5. The population of a town was 14,000 in 2010. If the population decreased at a rate of 1.5% each year thereafter, use an exponential function to find the population after 10 years.

$14000(1-1.5\%)^{10} = \$12036$

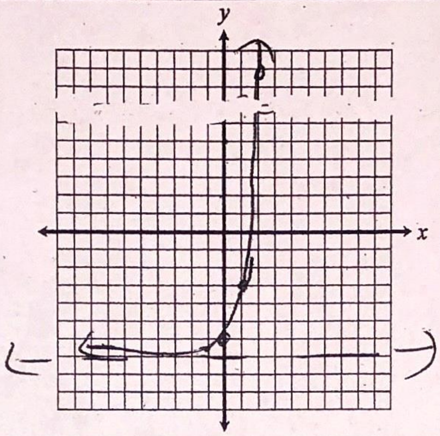
4. ______________

5. ______________

Graph each exponential function using a table, then identify its key characteristics.

6. $f(x) = 4^x - 7$

a: 1
b: 4
h: 0
k: $^-7$



stretch/shrink/neither
Growth / Decay

Domain: $\mathbb{R}$

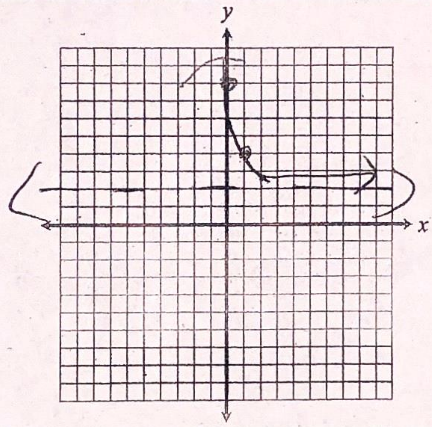
Range: $y > {}^-7$

y-intercept: $y = {}^-6$

Asymptote: $y = {}^-7$

7. $f(x) = 6 \cdot \left(\frac{1}{3}\right)^x + 2$

a: 6
b: $\frac{1}{3}$
h: 0
k: 2



stretch/shrink/neither
Growth / Decay

Domain: $\mathbb{R}$

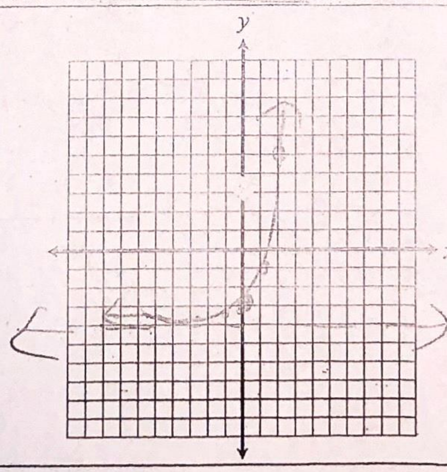
Range: $y > 2$

y-intercept: $y = 8$

Asymptote: $y = 2$

8. $y = 3^x - 4$

a: 1
b: 3
h: 0
k: -4



stretch/shrink/neither
Growth / Decay

Domain: $\mathbb{R}$

Range: $y > {}^-4$

y-intercept: $y = {}^-3$

Asymptote: $y = {}^-4$

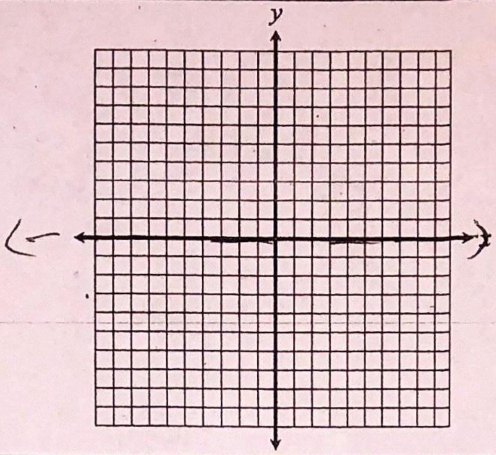
9. $y = \frac{1}{2} \cdot \left(\frac{1}{4}\right)^x$

a: $\frac{1}{2}$

b: $\frac{1}{4}$

h: 0

k: 0



stretch/shrink/neither

Growth / Decay

Domain: $\mathbb{R}$

Range: $y > 0$

***y*-intercept:** $y = \frac{1}{2}$

Asymptote: $y = 0$

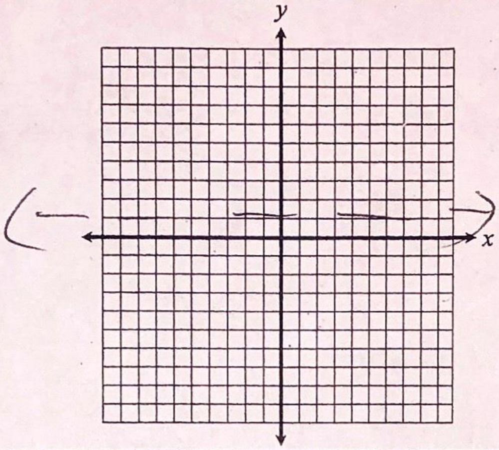
10. $y = \frac{3}{2} \cdot 2^x + 1$

a: $\frac{3}{2}$

b: 2

h: 0

k: 1



stretch/shrink/neither

Growth / Decay

Domain: $\mathbb{R}$

Range: $y > 1$

***y*-intercept:** $(0, \frac{5}{2})$ or $y = \frac{5}{2}$

Asymptote: $y = 1$

Topic 6: Exponential Growth & Decay Applications

EXPONENTIAL GROWTH FUNCTION	EXPONENTIAL DECAY FUNCTION:
11. $y = a(1 + \%)^x$	12. $y = a(1 - \%)^x$

13. A population of a city is 422,000 and increases by 12% each year. Use an exponential function to find the population of the city after 8 years.

$y = 422000(1 + 12\%)^8 =$

1044856

14. A car bought for \$13,000 depreciates at 15% per year. Use an exponential function to find the value of the car after 5 years.

$y = 13000(1 - 15\%)^5 =$ \$5768.17

15. Scott purchased a painting in 2006 for \$1,250. Since then, its value has increased by 6% each year. Use an exponential function find the value of the painting in 2017.

$$\begin{array}{r} 2017 \\ -2006 \\ \hline 11 \end{array}$$

$y = 1250(1 + 6\%)^{11} =$

\$2372.87