Name:_____   Date:_____

Pre Calculus 12 HW Ch7.1 Exponential and Logarithmic Function:

1. How do you tell if an equation is an exponential function? Explain

2. How do you tell if a scenario can be modeled with an exponential function? Explain:

3. How do you tell if an exponential function is increasing or decreasing? Explain:

4. Given the general formula of an exponential function: $y = A \times B^x \pm D$, what do the constants "A", "B", and "D" represent? Explain:

5. For each of the scenarios below, indicate if it can be modeled using an exponential function. If It can, indicate what the rate of change "B" and initial amount "A" are equal to
   i)   Mike owns a Tesla model 3 that he bought for $80,000. The value of the vehicle drops by 5% each year. What is the value of vehicle after 10 years?

   ii)   Tara makes $55/hour at a Law firm. In two hours, she earns $110, 3 hours - $165. How much will she earn in 40 hours?

   iii)   Donovan borrowed $25,000 from a credit union that charges him 3% interest each four weeks. If he doesn't pay down his loan, how much will he earn after 5 months?

   iv)   Sharon has a billion dollars in a trust account that generates 5% interest annually. However, each year she would donate 10% of the money in her trust account to a charity. How much money will she have left in her trust account after 20 years? How much will she have donated after 20 years?

6. What is the purpose of a logarithm? Explain:

7. For each of the equations below, indicate the values of "A" and "B". Then indicate whether if the function is increasing or decreasing. Also, find the Y-intercept and the equation of the Horizontal asymptote:

a) $y = 3(1.25)^x + 3$	b) $y = 2.5(0.85)^x - 2$
A = B =	A = B =
Increasing or Decreasing	Increasing or Decreasing
Y- intercept	Y- intercept
Horizontal Asymptote	Horizontal Asymptote
c) $y = -\dfrac{2}{3}\left(\dfrac{5}{8}\right)^x + 1$	d) $y = \sqrt{3}\left(\dfrac{\sqrt{2}}{3}\right)^x + 13$
A = B =	A = B =
Increasing or Decreasing	Increasing or Decreasing
Y- intercept	Y- intercept
Horizontal Asymptote	Horizontal Asymptote
e) $y = 2 \times (3^x)\left(\dfrac{1}{4}\right)^x + 6$	f) $y = 0.01\left(\sqrt{6}\right)^{2x} - 3$
	A = B =
A = B =	Increasing or Decreasing
Increasing or Decreasing	Y- intercept
Y- intercept	Horizontal Asymptote
Horizontal Asymptote	
g) $y = \dfrac{\left(2\sqrt{2}\right)^x + 3}{2}$	h) $y = \dfrac{2}{3}\left(-\dfrac{3}{7}\right)^x + 2$
A = B =	A = B =
Increasing or Decreasing	Increasing or Decreasing
Y- intercept	Y- intercept
Horizontal Asymptote	Horizontal Asymptote

8. Given the equations below, use logarithms to find the value of "x". Show all your work and steps

a) $3^x = 2187$	b) $2^{x+3} = 131072$	c) $3^{x+3} = 729^2$
d) $4^{x-2} = 2097152$	e) $4 \times 3^x = 200$	f) $6 \times \left(\sqrt{3}\right)^x = 1500$
g) $11 \times \left(\dfrac{2}{3}\right)^x = 5000$	h) $200(1.06)^x = 1000$	i) $152.2(1.0425)^x = 304$

9. A $100,000 used vehicle depreciates at a rate of 10% each year.
   a) Write an equation for the value of the car as a function of "t" years after purchase

   b) What is the value of the car after 5 years due to depreciation?

   c) How long will it take the vehicle to be worth 50% of it's purchase price?

   d) Use the graph provided to graph the value of the vehicle as a function time "t' years
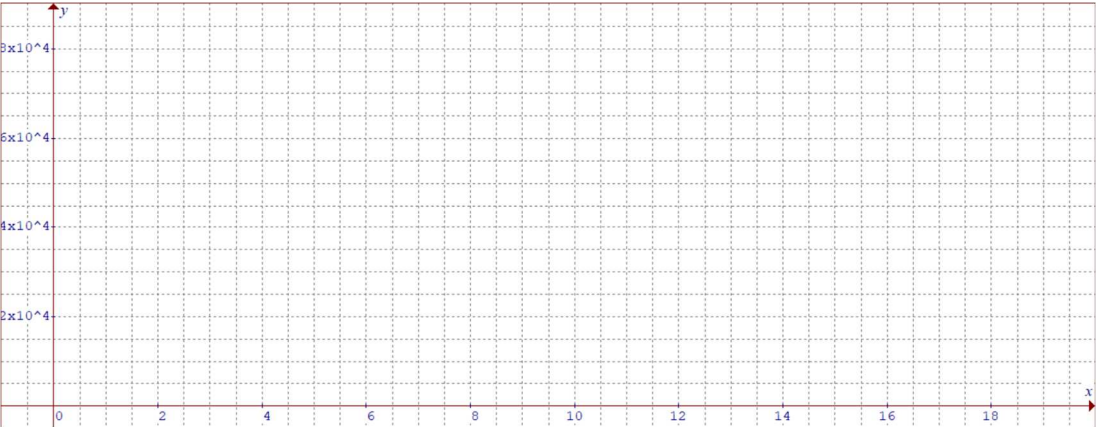
10. Bonnie invested $250,000 in a stock that pays 2.25% in dividends quarterly (every 3 months). The dividends are invested back into the stock. Suppose the stock price did not grow much in value.
   a) What is the rate of growth of her investment?

   b) How much will she have earned from dividends after 5 years?

   c) How long will it take for her investment to double in value?

   d) How long will it take for her investment to increase to $1 million dollars?

11. The formula $A = P\left(1+\dfrac{r}{n}\right)^{n \times t}$ is used for compound interest, where "A" is the accumulated amount, "P" is the principal, "r" is the annual interest rate, "n" is the number of compounds in a year, and "t" is the number of years.
   a) Suppose $25,000 was invested in a GIC at 5% interest compounded monthly. How much interest would be generated after 4 years?

   b) If the interest was compounded daily (n=365) or monthly (n=12), which would generate more money in interest? By how much more? How would this compare with compounded annually (n=1)? Explain:

   c) How long will it take an investment at a rate of 6% compounded monthly to double in value? Show your work

   d) How long will it take an investment at a rate of 8% compounded monthly to double in value? Show your work