Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Exponential Functions Assignment**

Part A: Show work to earn full marks. Answers must be left in *exact rational form* with positive exponents.

1. Simplify to a single power and THEN evaluate. (6 marks)

 a) $\frac{3(3^{4})}{(3^{4})^{2}}$ b) (2-2)(2-1)4 c) $\frac{(-9)^{2}(-9)^{3}}{(-9)^{5}}$

2. Evaluate the following: (5 marks)

 a) $\sqrt[4]{25^{2}}$ b) $\frac{-\sqrt[3]{125}}{\sqrt[5]{-243}}$ c) 25-1 + 8(5-1)2

3. Simplify the following: (7 marks)

 a) $-\frac{17x^{3}y}{x^{3}y^{5}}$ b) (4a2)-3(6a-1)2 c) $\frac{\left(mn^{4}\right)^{-0.5}}{m^{\frac{1}{2}}n^{-\frac{3}{2}}}$

4. Write each of the following with rational exponents.

 a) $\sqrt[4]{256^{-2}}$ b) $(\sqrt[3]{-125})^{4}$ c) $\sqrt[5]{243^{-2}}$

Part B: Show any work used to answer the questions to receive full marks.

1. How do you determine an exponential function when given
	1. A graph
	2. A table of values
	3. An equation
2. Determine if each function below is an exponential function. Justify your answer.

|  |  |
| --- | --- |
| x | Y |
| -3 | 1 |
| -2 | 3 |
| -1 | 9 |
| 0 | 27 |
| 1 | 81 |

a. b. $y=2(x-3)^{2}$ c. d. $y=-4^{2x-3}-1$

1. Determine if each of the following exponential functions are growth or decay functions and justify your answers.
	1. $y=-(0.5)^{-2x-1}$ b. $f\left(x\right)=-1(3)^{x}+5$ c. $g\left(x\right)=-(\frac{2}{3})^{3}$
2. Describe the transformations of the graph defined by $y=3^{x}$
	1. $f\left(x\right)=-2f\left(2x-6\right)+4$
	2. $g\left(x\right)=-\frac{1}{3}f\left(-x+3\right)-1$
	3. $h\left(x\right)=-f\left(.5x+4\right)+2$
3. Write the equations for the following transformations on the function defined by $y=6^{x}$
	1. Vertical stretch by a factor of 3, horizontal compression by a factor of $ \frac{1}{2}$, translated vertically up one unit.
	2. Reflection over the x-axis, horizontal stretch by a factor of 3, translated vertically 5 units up.
	3. Vertical compression by a factor of $\frac{1}{4}$ , horizontal compression by a factor of $\frac{1}{3}$, reflection over the x and y axis, translated horizontally 1 unit left and vertically 6 units down.
4. For each equation above determine the equation of the horizontal asymptote, the y-intercept, the domain and the range.
5. Sketch each of the functions.
	1. $y=-3\left(4\right)^{x+5}-2$ b. $f\left(x\right)=-3^{-0.5x-1}+4$
6. Complete the table below



1. A car depreciates according to the formula $V\left(n\right)=42000(0.82)^{n}$ where V is the value of the car in dollars and n is the number of years after the car is manufactured.
	1. Determine the initial price of the car.
	2. What is the annual rate of depreciation? (hint: decay rate).
	3. What would be the value of the car after 8 years?
	4. How much value does the car lose in the first year?
	5. What is its value after 30 months?
	6. How much does it lose in its fifth year?
2. A thousand cells double every 4 hours.
	1. Determine an equation to represent this situation.
	2. How many cells would there be after 16 hours?
	3. How many cells would there be after 26 hours?
3. Write an equation that represents each situation.
	1. $15000 is invested in an account that earns 4.25% interest each year.
	2. 250mg of a drug has a half life of 3 hours.
	3. The population of a city with 34560 people grows 3% each year.
	4. 100 people bought a new product the first month. The number of people who buy the product doubles every 5 months.