GATE Advanced Algebra

CHAPTER 7 ENRICHMENT: NOTES

EXPONENTIAL AND LOGARITHMIC FUNCTIONS

Name_____

Period _____ Date _____

Linear vs. Exponential Functions

1. The table shown to the right displays data for an increasing function.

x	*y*
1	7
2	11
3	15
4	19

   a) Can you **quickly** determine whether the function is **linear** or **exponential**? Justify your answer.

   b) Find the function for the table. Show all your work.

2. The table shown to the right displays data for an increasing function.

x	*y*
1	8
2	12
3	18
4	27

   a) Can you **quickly** determine whether the function is **linear** or **exponential**? Justify your answer.

   b) Find the function for the table. Show all your work.

3. Tables for three different decreasing functions are shown below. One of the functions is **linear**, one of them is **exponential**, and the other one is **neither** linear nor exponential.

Table 1	
x	*y*
0	64
2	4
5	2
6	1

Table 2	
x	*y*
0	64
2	50
5	29
6	22

Table 3	
x	*y*
0	64
2	16
5	2
6	1

   a) In questions #1 and #2 you were able to **quickly** determine whether the given data was **linear** or **exponential**. Can you do the same thing for these tables? Justify your answer.

   b) Is the data shown in table 1 linear, exponential, or neither? Show the work leading to your answer.

   c) If possible, give a function for the data shown in table 1.

   d) Is the data shown in table 2 linear, exponential, or neither? Show the work leading to your answer.

   e) If possible, give a function for the data shown in table 2.

   f) Is the data shown in table 3 linear, exponential, or neither? Show the work leading to your answer.

   g) If possible, give a function for the data shown in table 3.

GATE Advanced Algebra

CHAPTER 7 ENRICHMENT: HOMEWORK

EXPONENTIAL AND LOGARITHMIC FUNCTIONS

Name_____

Period _____ Date _____

Linear vs. Exponential Functions

1. The table shown to the right displays data for a decreasing function.

x	y
−1	27
0	18
1	12
2	8

   a) Can you **quickly** determine whether the function is **linear** or **exponential**? Justify your answer.

   b) Find the function for the table. Show all your work.

2. The table shown to the right displays data for a decreasing function.

x	y
−1	14
0	11
1	8
2	5

   a) Can you **quickly** determine whether the function is **linear** or **exponential**? Justify your answer.

   b) Find the function for the table. Show all your work.

3. Tables for three different increasing functions are shown below. One of the functions is **linear**, one of them is **exponential**, and the other one is **neither** linear nor exponential.

Table 1	
x	y
−2	8
0	50
1	125

Table 2	
x	y
−2	30
0	50
1	70

Table 3	
x	y
−2	10
0	50
1	70

   a) In questions #1 and #2 you were able to **quickly** determine whether the given data was **linear** or **exponential**. Can you do the same thing for these tables? Justify your answer.

   b) Is the data shown in table 1 linear, exponential, or neither? Show the work leading to your answer.

   c) If possible, give a function for the data shown in table 1.

   d) Is the data shown in table 2 linear, exponential, or neither? Show the work leading to your answer.

   e) If possible, give a function for the data shown in table 2.

   f) Is the data shown in table 3 linear, exponential, or neither? Show the work leading to your answer.

   g) If possible, give a function for the data shown in table 3.

ANSWER SHEET

Linear vs. Exponential Functions

1. The table shown to the right displays data for a decreasing function.

x	y
-1	27
0	18
1	12
2	8

   a) Can you **quickly** determine whether the function is **linear** or **exponential**? Justify your answer.

Yes, the data is exponential. Since the input values are "equally spaced" (there are equal increments of x on the table) we can look at the ratio of the outputs to quickly determine whether the data is exponential. The ratio $\frac{2}{3}$ repeats throughout the table.

   b) Find the function for the table. Show all your work.

$$y = 18\left(\frac{2}{3}\right)^x$$

2. The table shown to the right displays data for a decreasing function.

x	y
-1	14
0	11
1	8
2	5

   a) Can you **quickly** determine whether the function is **linear** or **exponential**? Justify your answer.

Yes, the data is linear. Since the input values are "equally spaced" (there are equal increments of x on the table) we can look at the difference of the outputs to quickly determine whether the data is exponential. The difference -3 repeats throughout the table.

   b) Find the function for the table. Show all your work.

$$y = -3x + 11$$

3. Tables for three different increasing functions are shown below. One of the functions is **linear**, one of them is **exponential**, and the other one is **neither** linear nor exponential.

Table 1	
x	y
-2	8
0	50
1	125

Table 2	
x	y
-2	30
0	50
1	70

Table 3	
x	y
-2	10
0	50
1	70

a) In questions #1 and #2 you were able to **quickly** determine whether the given data was **linear** or **exponential**. Can you do the same thing for these tables? Justify your answer.
No, we cannot "quickly" determine whether the data is linear or exponential since the input values are NOT "equally spaced" (there are no equal increments of x on the table.)

b) Is the data shown in table 1 linear, exponential, or neither? Show the work leading to your answer.
Table 1 shows exponential data. Using points $(0, 50)$ and $(1, 125)$, we have $y = 50\left(\frac{5}{2}\right)^x$. We can verify that the other point on the table follows this exponential model.

c) If possible, give a function for the data shown in table 1.
$$y = 50\left(\frac{5}{2}\right)^x$$

d) Is the data shown in table 2 linear, exponential, or neither? Show the work leading to your answer.
The data in table 2 is neither linear nor exponential. It is not linear because the slope between any two given points is NOT the same (for $(-2, 30)$ and $(0, 50)$, we have $m = 10$, but for $(0, 50)$ and $(1, 70)$, we have $m = 20$.) It not exponential because using points $(0, 50)$ and $(1, 70)$, we have $y = 50\left(\frac{7}{5}\right)^x$ and the other point on the table does NOT match this function.

e) If possible, give a function for the data shown in table 2.
We cannot find a function to model table 2.

f) Is the data shown in table 3 linear, exponential, or neither? Show the work leading to your answer.
Table 3 shows linear data. The slope between any two points in the line is always the same, $m = 20$.

g) If possible, give a function for the data shown in table 3.
$$y = 20x + 50$$