**Graphing Exponential Equations Notes**

|  |  |
| --- | --- |
| **x** |  |
|  | .25 |
|  | .5 |
| 0 | 1 |
| 1 | 2 |
| 2 | 4 |
| 3 | 8 |

The graph and table below represent the function . Use this graph and equation to answer the following questions.

Type the function into in your calculator.

Domain: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Range: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| **x** |  |
|  |  |
|  |  |
| 0 |  |
| 1 |  |
| 2 |  |
| 3 |  |

*Exponential functions have what is known as a* ***horizontal asymptote****. An asymptote is a line that the graph approaches, but never touches or crosses. The horizontal asymptote for the function is the line*

On the graph above, graph the function in green. How is this graph different than ?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Identify the key features below for

Domain: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Range: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Asymptote at: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| **x** |  |
|  |  |
|  |  |
| 0 |  |
| 1 |  |
| 2 |  |
| 3 |  |

How do you think the graph of will differ from the graph of

Predict the key features of

Domain: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Range: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Asymptote at: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Graph the function in blue. Re-check your answers to see if your predictions are true.

*When graphing exponential functions, an important key features is the* ***end behavior*** *of the graph. End behavior looks at the left end and right end of the graph to see what the* ***y-values*** *are doing.*

**For the end behaviors are listed below:**

(This is because the y-values on the right side of the graph are increasing towards )

(This is because the y-values on the left side of the graph are approaching the horizontal asymptote of

Using the examples above, what you think the end behaviors would be for and

\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_

*These three functions modeled* ***exponential growth.*** *They all had a growth factor of 2, because 2 was the base of these exponential functions. As a result, they are* ***always increasing.*** *The functions below model* ***exponential decay*** *and will be* ***always decreasing.*** *Work through the examples below and look for similarities and differences in the key features of exponential graphs.*

The graph and table below represent the function . Use this graph and equation to answer the following questions.



|  |  |
| --- | --- |
| **x** |  |
|  | 8 |
|  | 4 |
| 0 | 2 |
| 1 | 1 |
| 2 | .5 |
| 3 | .25 |

Domain: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Range: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Based on your knowledge of translations from Unit 1, how do you think the graph of might differ from the graph of ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| **x** |  |
|  |  |
|  |  |
|  |  |
|  |  |
| 0 |  |
| 1 |  |

Do you think this type of translation will affect any of the key features of the graph? (Domain, range, or asymptote)? Explain. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

On the graph above, graph the function in green. Check your predictions and see if you were right.

Identify the key features below for

Domain: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Range: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Asymptote at : \_\_\_\_\_\_\_\_\_\_\_\_\_

Based on your knowledge of translations from Unit 1, how do you think the graph of might differ from the graph of ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Do you think this type of translation will affect any of the key features of the graph? (Domain, range, or asymptote)? Explain. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| **x** |  |
| 0 |  |
| 1 |  |
| 2 |  |
| 3 |  |
| 4 |  |
| 5 |  |

On the same graph, graph the function in blue. Check your predictions and see if you were right.

Identify the key features below for

Domain: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Range: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Asymptote at : \_\_\_\_\_\_\_\_\_\_\_\_\_

*When graphing exponential functions, an important key features is the* ***end behavior*** *of the graph. End behavior looks at the left end and right end of the graph to see what the* ***y-values*** *are doing.*

**For the end behaviors are listed below:**

(Because the y-values on the right side of the graph are approaching the horizontal asymptote of

(This is because the y-values on the left side of the graph are increasing towards

1. Using the examples above, what you think the end behaviors would be for and

\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_

**Graphing Exponential Practice**

***Identify the transformations that occurred to each equation below based on either the parent function . Identify the horizontal asymptote based on the transformation.***

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Horizontal asymptote at y = \_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Horizontal asymptote at y = \_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Horizontal asymptote at y = \_\_\_\_\_\_\_\_\_\_\_

1. +8

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Horizontal asymptote at y = \_\_\_\_\_\_\_\_\_\_\_

***For each exponential equation below, identify the horizontal asymptote, domain, and range.***

Horizontal asymptote at y = \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Domain: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Range: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

as \_\_\_\_\_\_\_\_\_ as \_\_\_\_\_\_\_

Horizontal asymptote at y = \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Domain: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Range: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

as \_\_\_\_\_\_\_\_\_ as \_\_\_\_\_\_\_

Horizontal asymptote at y = \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Domain: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Range: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

as \_\_\_\_\_\_\_ as \_\_\_\_\_\_

Horizontal asymptote at y = \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Domain: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Range: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

as \_\_\_\_\_\_\_ as \_\_\_\_\_\_