Lesson 6: Graphing Exponential Functions

Question #1

Reference Q.11402

Graph the following exponential function. Then identify the domain, range, x-intercept, y-intercept and the horizontal asymptote.

$$f(x) = \left(\frac{1}{4}\right)^x$$

Question #2

Reference Q.11404

Graph the following exponential function. Then identify the domain, range, x-intercept, y-intercept and the horizontal asymptote.

$$f(x) = 3(2)^x$$

Question #3

Reference Q.11405

Graph the following exponential function. Then identify the domain, range, x-intercept, y-intercept and the horizontal asymptote.

$$f(x) = \frac{1}{2}(3)^x - 2$$

Question #4

Reference Q.11406

Graph the following exponential function. Then identify the domain, range, x-intercept, y-intercept and the horizontal asymptote.

$$f(x) = 4\left(\frac{1}{3}\right)^x + 3$$

Question #5

Reference Q.11408

Graph the following exponential functions on the same grid. At what value do they cross?

$$f(x) = 2\left(\frac{1}{5}\right)^x - 1, g(x) = \frac{1}{2}(4)^x - 3$$

Question #6

Reference Q.11407

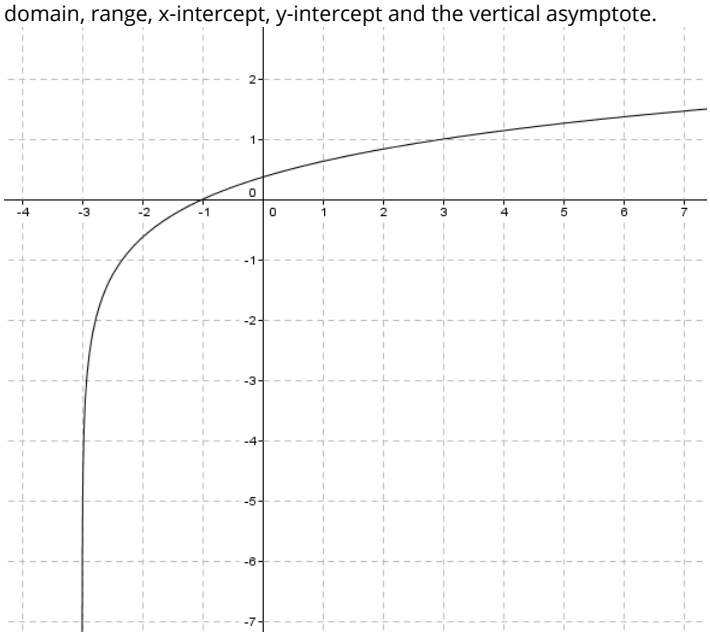
Graph the following exponential function. Then identify the domain, range, x-intercept, y-intercept and the horizontal asymptote.

$$f(x) = 15(1)^x - 7$$

Question #7

Reference Q.11429

Given the graph of the following logarithmic function, identify the domain, range, x-intercept, y-intercept and the vertical asymptote.



Question #8

Reference Q.12748

The graph below represents the population of a city over time.

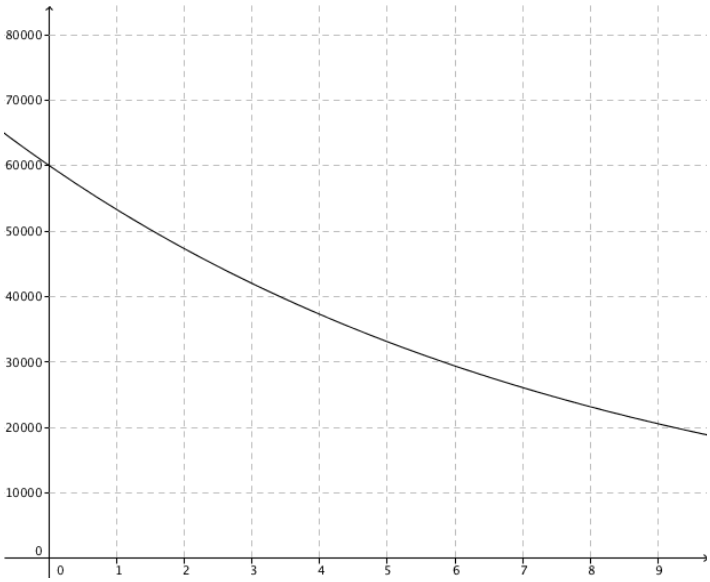
a. What is the initial population?

b. Using the graph, estimate how long it will be until the city reaches a population of 30,000.

c. Does this graph represent linear or exponential change?

d. Is the change growth or decay?

e. Can you come up with an equation for this exponential function?



Question #9

Reference Q.12749

The graph below represents the population of ants in an ant colony over time in weeks.

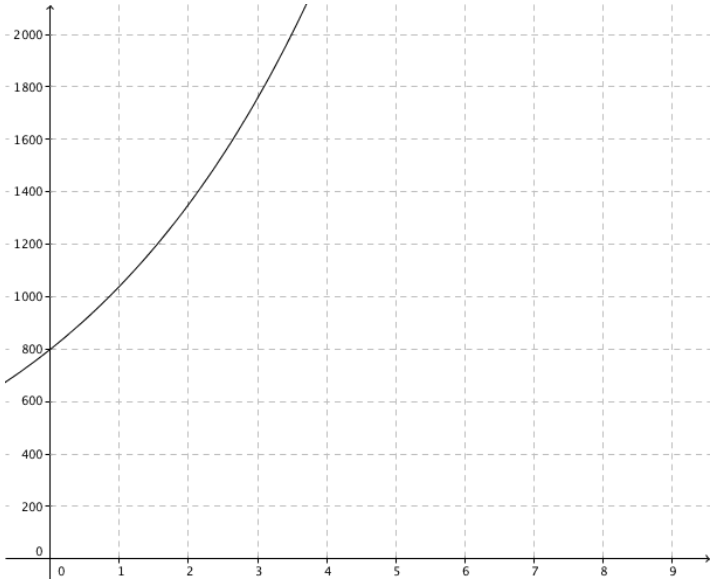
a. What is the initial population?

b. Using the graph, estimate how long it will be until the city reaches a population of 1600.

c. Does this graph represent linear or exponential change?

d. Is the change growth or decay?

e. Can you come up with an equation for this exponential function?



Question #10

Reference Q.12750

The halflife of the radioactive isotope niobium-94 is 20,300 years. If we started with 250 grams of niobium, an equation that represents the decay would be: $P(t) = 250(0.5)^{\frac{x}{20,300}}$

a. What would be a suitable domain and range to view the important features of this graph?

b. Graph this function using technology.

c. How did you adjust the range after graphing?

Question #11

Reference Q.12751

The number of transistors per square inch on a microchip has been roughly doubling every two years since 1974 when the Intel 4040 chip had 2300 transistors. This has held true for the past 50 years!

a. Write an equation that represents this growth as a function of years since 1974, and graph it using an appropriate scale.

b. Can you use this graph to estimate how many transistors are in a chip today? In 50 years from now?

c. Why or why not?

Question #12

Reference Q.11683

State the x and y-intercepts for the graphs of the following:

a. $f(x) = 2^x$

b. $f(x) = (2)10^x$

c. $f(x) = 2^{10x}$

d. $y = \left(-\frac{1}{2}\right)\left(\frac{3}{5}\right)^x$

Question #13

Reference Q.11684

a. State the domain and range of the function $f(x) = ab^x, a > 0, b > 0, x \in \mathbb{R}.$

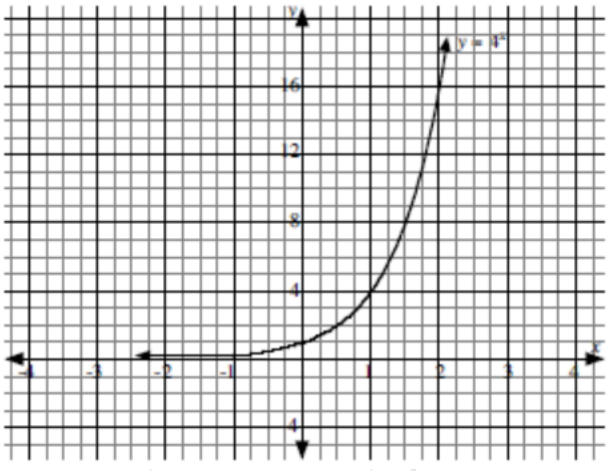
b. Which of the following transformations applied to the graph of $y = ab^x, a, b > 0, x \in \mathbb{R},$ would result in a change to the domain of the function?
i) horizontal stretch about the y-axis
ii) vertical stretch about the x-axis
iii) horizontal translation
iv) reflection in the x-axis
v) reflection in the y-axis
vi) reflection in the line $y = x$

c. Which of the above transformations applied to the graph of $y = ab^x, a, b > 0, x \in \mathbb{R},$ would result in a change to the range of the function?

Question #14

Reference Q.11685

The graph of the exponential function with equation $y = 4^x$ is shown.



a. Use the graph to estimate, to one decimal place, the solution to the equation $4^x = 12.$

b. Use a graphing calculator to determine, to one decimal place, the solution to the equation $4^x = 12.$

c. Explain how to use the graph of $y = 4^x$ to graph the function with equation $y = \left(\frac{1}{4}\right)^x$. Sketch the graph on the grid.

d. Without using the grid or a graphing calculator, state the solution to the equation $\left(\frac{1}{4}\right)^x = 12.$

e. Use transformations to sketch the graph of the function with equation $y = \left(\frac{1}{4}\right)^{x-2} - 4$ and state the domain and the range of the function.

Question #15

Reference Q.11686

Describe how the graph of the second function compares to the graph of the first function.

a. $y = 10^x, y = 10^{-x} - 3$

b. $y = 2^x, y = 5\left(\frac{1}{2}\right)^x$

c. $y = 6^x, y = \left(\frac{1}{6}\right)^{-x}$

d. $y = a^x, y = -a^{\frac{x}{2}}$

Question #16

Reference Q.11687

Consider the function $y = f(x) = 5^{x+4} + 3.$ Without using a graphing calculator, determine

a. the domain and range of the function

b. the x- and y-intercepts of the graph of the function

c. the equation(s) of any asymptotes of the graph of the function

Question #17

Reference Q.11688

Consider the function $f(x) = b^{x-h} + k.$ Determine

a. the domain and range of the function

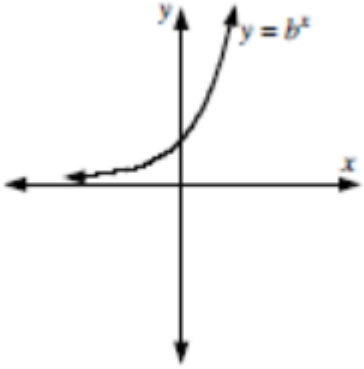
b. the y-intercept of the graph of the function

c. the equation of the horizontal asymptote of the graph of the function

Question #18

Reference Q.11689

The graph of $f(x) = b^x$ is shown.



Sketch $f^{-1}(x).$

a. State the domain and range of $f(x).$

b. State the domain and range of $f^{-1}(x).$

c. State the asymptotes fr $y = f(x)$ and $y = f^{-1}(x).$

Question #19

Reference Q.11690

Which equation represents an exponential function?

A. $y = 2x^8$

B. $y = (-3)^x$

C. $y = \frac{3^{x-2}}{2}$

D. $y = \frac{1}{3x}$

Question #20

Reference Q.11691

A student is attempting to sketch the graph of the function $f(x) = 3^{x-2} - 1$ without using a graphing calculator. Which of the following is an asymptote of the graph?

A. $x = -2$

B. $x = 2$

C. $y = 1$

D. $y = -1$

Question #21

Reference Q.11692

A student is attempting to sketch the graph of the function $f(x) = 3^{x-2} - 1$ without using a graphing calculator. The range of f is

A. $f(x) \in \mathbb{R}$

B. $\{f(x) | f(x) > -2, f(x) \in \mathbb{R}\}$

C. $\{f(x) | f(x) \geq -1, f(x) \in \mathbb{R}\}$

D. $\{f(x) | f(x) > -1, f(x) \in \mathbb{R}\}$

Question #22

Reference Q.11693

A student is attempting to sketch the graph of the function $f(x) = 3^{x-2} - 1$ without using a graphing calculator. The x-intercept of the graph is

A. 0

B. 2

C. 3

D. there is no x-intercept