Problem 1. **(5 points)**

Consider the three exponential functions $f(x) = a \cdot b^x$, in red, $g(x) = c \cdot d^x$, in blue, and $h(x) = p \cdot q^x$, in green, graphed below where a, b, c, d, p, q are constants.

For each statement below, enter all of the possible constants (letters a, b, c, d, p, or q) as a list of letters in any order **without any separating commas.** For example a possible answer could be **apdq** which is equivalent to **paqd** (or any other order of these four constants), but *a, d, p, q* would not be graded correctly because it includes commas.

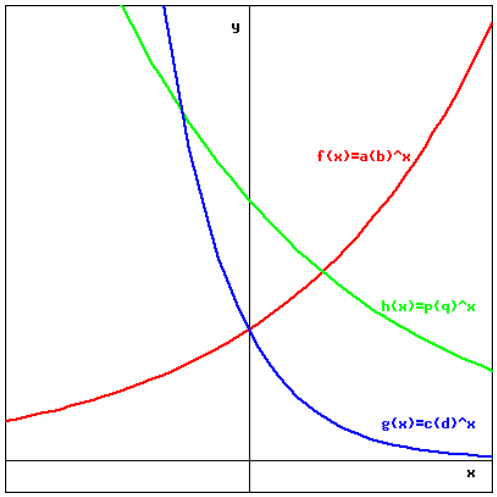
(a) Which of these constants are definitely positive? _____

(b) Which of these constants are definitely greater than 1? _____

(c) Which of these constants could possibly be between 0 and 1? _____

(d) Which of these constants could possibly be greater than the value of p ? _____

(e) Which two of these constants are definitely equal? _____



(Click on graph to enlarge)

Answer(s) submitted:

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(incorrect)

Problem 2. **(2 points)**

The population of a colony of rabbits grows exponentially. The colony begins with 5 rabbits; 5 years later there are 360 rabbits.

(a) Express the population of the colony of rabbits, P, as a function of time, t, in years.
$P(t) =$ _____

(b) Use the graph to estimate how long it takes for the population of rabbits to reach 1000 rabbits.
It will take _____ years. (round to nearest 0.01 year)
Answer(s) submitted:

-
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(incorrect)

Problem 3. **(4 points)**

Let $P = f(t) = 750(1.045)^t$ be the population of a community in year t.

(a) Evaluate $f(0) =$ _____

(b) Evaluate $f(10) =$ _____ (retain at least 3 decimal places)

(c) Which of these statements correctly explains the practical meaning of the value you found for $f(10)$ in part (b)? (select all that apply if more than one is correct)

- A. How many years it takes for the population to reach 10,000 people.
- B. How much the population will increase in 10 years.
- C. What the population will be in 10 years.
- D. The growth rate per decade of the population.
- E. The initial population of the community.
- F. How long it will take for the population to increase by 10 people.
- G. None of the above

(d) If the percentage growth rate remains constant, approximately when will the population reach 1900 people?
In _____ years (round to the nearest whole year).
Answer(s) submitted:

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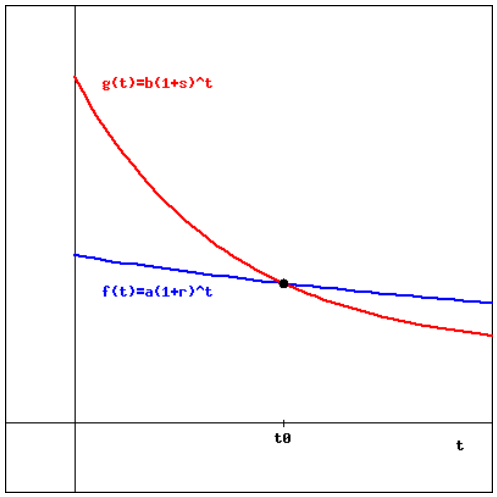
(incorrect)

Problem 4. **(1 point)**

Suppose t_0 is the t -coordinate of the point of intersection of the graphs below. Complete the statement below in order to correctly describe what happens to t_0 if the value of r (in the blue graph of $f(t) = a(1+r)^t$ below) is increased, and all other quantities remain the same.

As r increases, does the value of t_0 increase, decrease, or remain the same? ?



(click on image to enlarge)

Answer(s) submitted:

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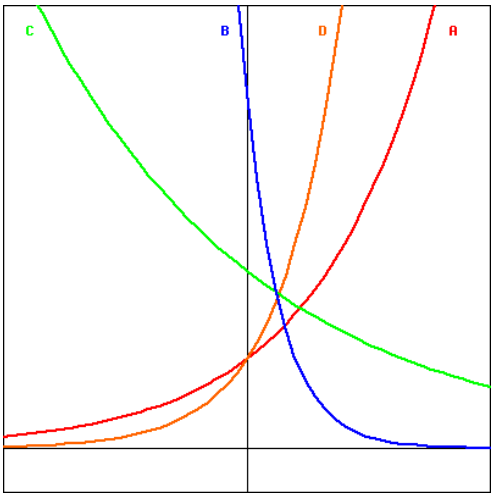
(incorrect)

Problem 5. **(1 point)**

Consider the four functions graphed in the figure below, and assume the equations for A, B, C, and D can all be written in the form $y = ab^t$.

Which function has the largest value for a? ?



(Click on graph to enlarge)

Answer(s) submitted:

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(incorrect)

Problem 6. **(5 points)**

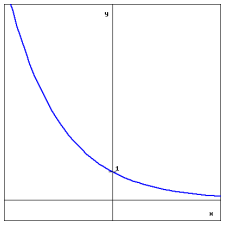
Consider the function $f(x) = (1/4)^x$.

(a) Complete the table of values of $f(x)$ for $x = -3, -2, -1, 0, 1, 2, 3$.

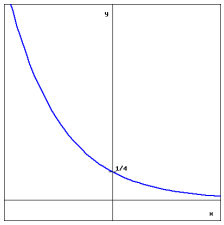
x	-3	-2	-1	0	1	2	3
$f(x)$	_____	_____	_____	_____	_____	_____	_____

(b) Which of the graphs below could represent the graph of $f(x)$?

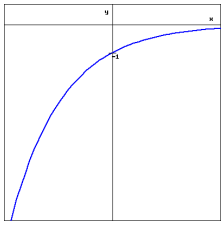
?



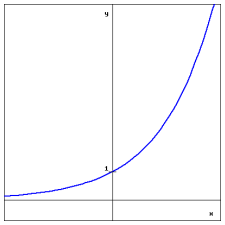
A



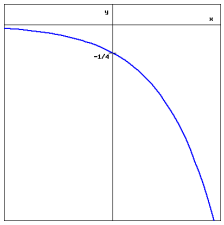
B



C



D



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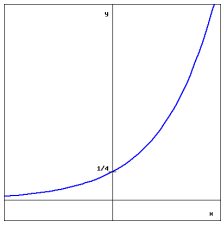

F

(Click on a graph to enlarge it.)

Answer(s) submitted:

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(incorrect)

Problem 7. **(2 points)**

Find the x- and y-intercepts of $f(x) = 7\log_4(-10x-9)+10$. Write **none** if such a point does not exist.

x-intercept: _____

y-intercept: _____

Answer(s) submitted:

-
-

(incorrect)

Problem 8. **(1 point)**

Solve for x: $3e^{2x} = 6e^{4x}$

$x =$ _____

Answer(s) submitted:

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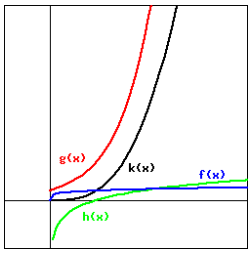
(incorrect)

Problem 9. **(4 points)**



Without a calculator or computer, match the function 4^x, x^3, $\ln(x)/\ln(3)$ and $x^{1/5}$ to their graphs in the figure.

$f(x) =$ _____ (the blue curve)
$g(x) =$ _____ (the red curve)
$h(x) =$ _____ (the green curve)
$k(x) =$ _____ (the black curve)

Answer(s) submitted:

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(incorrect)

Problem 10. **(1 point)**

Find the solution of the exponential equation

$$3e^x = 2$$

in terms of logarithms, or correct to four decimal places.

$x =$ _____

Answer(s) submitted:

-

(incorrect)

Problem 11. **(1 point)**

Find the exact solution to the equation below.

$$\frac{\log(x^3)+\log(x^4)}{\log(70x)} = 4$$

$x =$ _____

Answer(s) submitted:

-

(incorrect)

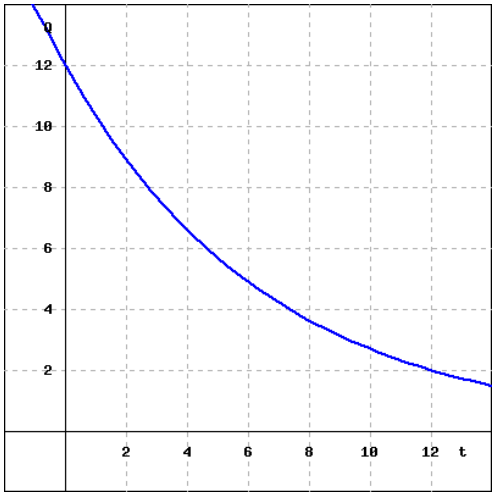
Problem 12. **(3 points)**

A graph of $Q = 12e^{-0.15t}$ is given in the figure.

(a) What is the initial value of Q (when $t = 0$)?
$Q(0) =$ _____ help (numbers)

(b) Use the graph to estimate the value of t when $Q = 6$.
$t \approx$ _____ help (numbers)

(c) Use logs to find the exact value of t when $Q = 6$.
$t =$ _____ help (logarithms)



(Click on graph to enlarge)

Answer(s) submitted:

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(incorrect)

Problem 13. **(1 point)**

Find the exact solution to the equation below. *(Do not give a decimal approximation.)*

$$\log(3-x) - \log(1+x) = 2.$$

$x =$ _____ help (numbers)

Answer(s) submitted:

-

(incorrect)