

Math 115 - Team Homework Assignment #1, Winter 2016

- **Due Date:** January 19 or 20 (Your instructor will tell you the exact date and time.)
 - Note: All problem, section, and page references are to the course textbook, which is the 6th edition of *Calculus: Single Variable* by Hughes-Hallett, Gleason, McCallum, et al.
 - Remember to follow the guidelines from the “Doing Team Homework” and “Team HW Tutorial” links in the sidebar of the course website.
 - Do not forget to rotate roles and include a reporter’s page each week.
 - Show ALL your work.
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1. Let $f(z), g(z), u(z)$, and $v(z)$ be functions satisfying the following properties:

- $f(z)$ is an exponential function.
- $g(z)$ is an invertible function.
- $u(z) = f(z)g(z)$ for all z in the domain of u .
- $v(z) = g^{-1}(f(z))$ for all z in the domain of v .

(a) Some values of the functions f, g, u , and v are given in the table below. Fill in the missing values in the table.

z	$f(z)$	$g(z)$	$u(z)$	$v(z)$
1	?	?	18	?
2	6	?	?	?
3	?	?	?	3
5	?	3	144	2

(b) Using the information from part (a), write a formula for $f(z)$.

2. Joey drives for exactly 4 hours non-stop from his apartment to his grandma’s house (where his trip ends). Let $G(m)$ be the total number of gallons of gas his car has used in the first m minutes of his trip.

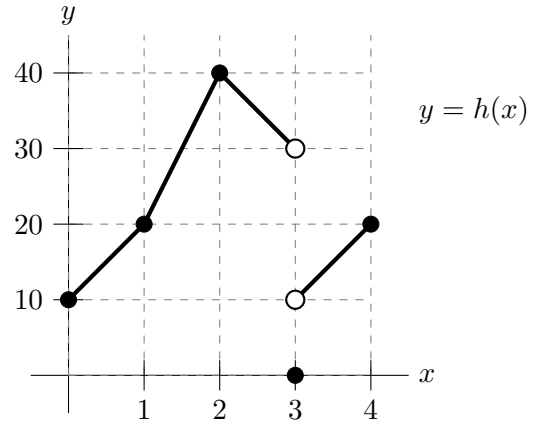
- Interpret the equation $G(45) = 1.7$ in the context of this problem. (Remember to use a complete sentence and include units.)
- What is the domain of the function G ?
- Why is it reasonable to assume that G is an invertible function?
- Interpret the equation $G^{-1}(2.1) = 60$ in the context of this problem. (Again, remember to use a complete sentence and include units.)
- Let $Q(h)$ be the total number of *quarts* of gas Joey’s car has used in the first h hours of his trip. Write a formula for $Q(h)$ in terms of G and h . (Recall that there are 4 quarts in 1 gallon.)

3. Abby and Bobby decide to work on their calculus homework together. Let $A(t)$ be the percentage of Abby's homework remaining t hours after they start working, and let $B(t)$ be the percentage of Bobby's homework remaining t hours after they start working.
- (a) Interpret the equation $B(A^{-1}(50)) = 47.1$ in the context of this problem. (Remember to use a complete sentence and include units.)
- (b) The chart below gives the values of $A(t)$ and $B(t)$ at three times t . The function values shown are accurate to one decimal place.

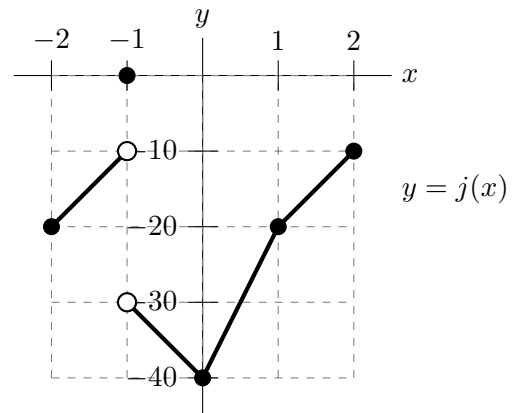
t	$A(t)$	$B(t)$
0	100.0	100.0
1	71.2	74.1
3	36.1	22.3

Suppose that each of $A(t)$ and $B(t)$ is either exponential or linear. Using the above chart, find formulas for $A(t)$ and $B(t)$, and indicate whether each is a linear or exponential function.

4. The graph of a function h is shown to the right:



- (a) The graph of a function j is shown to the right:



Write a formula for the function $j(x)$ in terms of h and x .

- (b) Suppose $k(x) = \frac{1}{2}x + 1$, and let n be the function defined by $n(x) = 3h(k(x))$. Sketch a graph of $n(x)$, and write a piecewise-defined formula for $n(x)$.