

MA 113 CALCULUS I, SPRING 2015
WRITTEN ASSIGNMENT #1
Due Friday, 23 January 2015 at the beginning of lecture.

Instructions: The purpose of this assignment is to develop your ability to formulate and communicate mathematical arguments. Your complete assignment should have your name and section number on each page, be stapled, and be neat and legible. *Unreadable work will receive no credit.*

You should provide well-written, complete answers to each of the questions. We will look for correct mathematical arguments, careful explanations, and correct use of English. Your solution should be formulated in complete sentences. As appropriate, you may want to include diagrams or equations written out on a separate line. Your textbook provides examples of how we communicate mathematics.

Students are encouraged to use word-processing software to produce high quality solutions. However, you may find that it is simpler to add graphs and equations using pen or pencil.

1. (5 points) We have a sheet of cardboard that is 20 centimeters by 30 centimeters and form a box with an open top by removing squares from each of the four corners of the rectangle and folding up the flaps on each side.
 - (a) Make a sketch of the sheet of cardboard showing the four corners to be removed.
 - (b) Write a function V that gives the volume of the resulting box in terms of x , the sidelength of the square that is removed.
 - (c) Give the domain of the function V and explain why you chose this domain.
2. (5 points) Let f be the function defined by $f(x) = x^2 + 4x + 1$ and domain all real numbers.
 - (a) Solve the equation $f(x) = 1$ and explain whether or not the function f is one to one.
 - (b) Let g be the function $g(x) = x^2 + 4x + 1$ with the domain $(-\infty, a]$. Find the largest value of a for which the function g is one to one. Fix a to have this value and find the inverse function g^{-1} .
 - (c) Sketch the graphs of g and g^{-1} on the same axes and describe the relation between the two graphs.

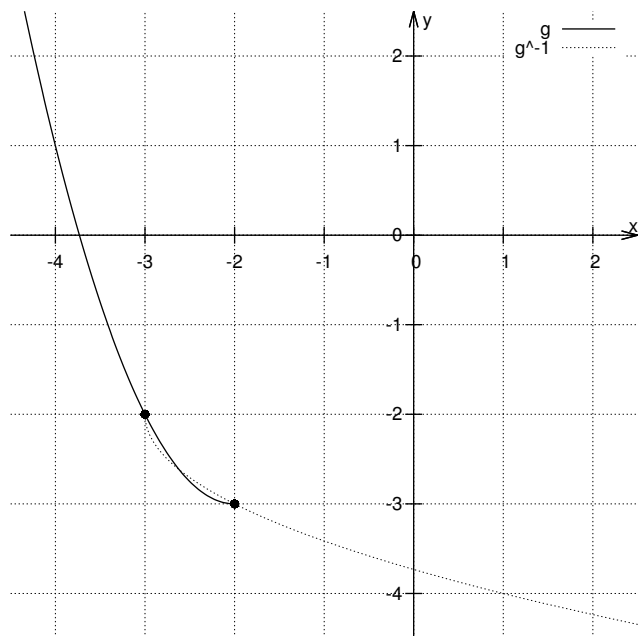


Figure 1: Graph of g and g^{-1}