Math 145A
Winter 2016

UPDATED GENERAL INFORMATION — JANUARY 11, 2016

Definitions of fundamental concepts from Chapter 4

It is important to be so familiar with a few definitions and axioms that there is no need to search for them when these concepts appear. Otherwise the chances of getting lost as the course progresses are very high. Therefore the following definitions and axioms should be memorized:

> The definitions of a least upper bound and a greatest lower bound.
> The completeness property (axiom) for the real number system.
> The definition of a limit for a sequence.
> The definition of a continuous function for a real valued function of one variable.

Simple examples of least upper bounds and greatest lower bounds should also be understood. Regarding limits and continuity, it is also worthwhile to understand how these apply to linear functions of the form $f(x) = mx + b$ and to have a passive understanding of the argument showing that for linear functions we have

$$\lim_{x \to a} \; f(x) \quad = \quad f(a)$$

(in which case the δ corresponding to ε can be taken to be $\varepsilon/|m|$ if $m \neq 0$ and and can be taken to be an arbitrary positive number if $m = 0$).

Here is the difference between *passive understanding* and *active understanding*:

> A passive understanding means that one can follow the reasoning presented in a written proof fairly well.
>
> An active understanding means that one knows the argument well enough to explain it correctly — or nearly so — to someone else (for example, on a quiz or examination).