MATH 351 Fall 2015 Homework 4   Due: Thursday 10/01

Read Sections 1.4 and 1.5 in your book.

(1) Prove or Disprove: If $X \subset \mathbb{R}$ and the set of upper bounds of X is $[3, \infty)$ then $2 \in X$.

(2) Let $c \in \mathbb{R}$ and, for $S \subset \mathbb{R}, S \neq \emptyset$ be bounded, define the set

$$c - S = \{c - s | s \in S\}.$$

Show that $\sup(c - S) = c - \inf(S)$

(3) Given sets $A, B \subset \mathbb{R}$, we define the set $A + B$ to be the set of all sums of elements of A with elements of B. Prove and extend or disprove and salvage: If A and B are nonempty, at most countably infinite, and bounded above, then $\sup(A + B) = \sup A + \sup B$.

(4) Prove that for all $x \in \mathbb{R}^+$ there exists a number $\beta \in \mathbb{R}$ satisfying $\beta^2 = x$.