THE CHINESE UNIVERSITY OF HONG KONG
Department of Mathematics

MATH 2050B Mathematical Analysis I

Tutorial 1 (September 12)

The following were discussed in the tutorial this week:

1. If $a, b \in \mathbb{R}$, show that
   (a) $a \cdot 0 = 0$,
   (b) if $a + b = 0$, then $b = -a$,
   (c) $(-1)a = -a$
   (d) $-(-a) = a$
   (e) $(-a)(-b) = ab$
   (f) if $a \neq 0$, then $1/a \neq 0$ and $1/(1/a) = a$
2. Let $a, b \in \mathbb{R}$.
   (a) Show that $a^2 \geq 0$.
   (b) i. Show that if $a > 0$, then $1/a > 0$.
   ii. Show that if $0 < a < b$, then $0 < 1/b < 1/a$.
3. Show that $|x - a| < \varepsilon$ if and only if $a - \varepsilon < x < a + \varepsilon$.
4. Find all $x \in \mathbb{R}$ satisfying $|x| + |x + 1| < 2$.
5. Let A be a nonempty subset of $\mathbb{R}$ and $u \in \mathbb{R}$. Give the definition for each of the following and the corresponding negation:
   (a) u is an upper bound of A.
   (b) A is bounded above.