

**Math313**  
**Homework 1, due Friday, January 22**

1. Let

$$A = \{1, 5, t, a, \text{word}\}, \quad B = \{\text{word}, \S, 5, 6, t\}.$$

Find  $A \cap B$ ,  $A \cup B$ ,  $A \setminus B$ ,  $B \setminus A$ ,  $A \Delta B$ .

1.a Do the same problem for the sets

$$A = [0, 3), \quad B = (2, 4].$$

2. Prove that for a bounded set  $A$ , its  $\inf A$  and  $\sup A$  are unique.

2.a Prove that for two bounded sets  $A$  and  $B$  in  $\mathbb{R}$  the following hold

$$\begin{aligned} \sup(A + B) &= \sup A + \sup B, \\ \inf(A + B) &= \inf A + \inf B. \end{aligned}$$

3. Let  $A = (0, 1) \cup \{-1\}$ . Find  $\inf A$ ,  $\sup A$ , and  $\max A$  and  $\min A$  if they exist.

4. Show that the number  $\sqrt[3]{3}$  is irrational.