

Math 112 Homework for Friday, Week 2

1. Prove that  $A \times (B \cap C) = (A \times B) \cap (A \times C)$ .
2. Let  $A$  have  $m$  elements and  $B$  have  $n$  elements.
  - (a) How many elements are there in the set  $A \times B$ ? Explain your reasoning as best as you can.
  - (b) How many relations are there on  $A$  and  $B$  (these will be subsets of  $A \times B$ )? Explain your reasoning as best as you can.
3. Let  $A = \{a, b\}$  and  $B = \{b, c, d\}$ .
  - (a) List all the elements of the set  $A \times A$ .
  - (b) List all the elements of the set  $A \times B$ .
  - (c) How many relations are there on  $A$  and  $B$ ? (again, these are subsets of  $A \times B$ ).
  - (d) How many relations are there on  $A \cup B$ ?
  - (e) How many relations are there on  $A \cap B$ ?