MATH 113: DISCRETE STRUCTURES
HOMEWORK 3

Due: Wednesday February 4 by 10pm.

This is homework on the content covered Friday of Week 1.

Problem 1. Let A and B be finite sets. Explain why

$$|A \cup B| = |A| + |B| - |A \cap B|.$$

Problem 2. Let A, B, C and D be sets.

(a) Prove that

$$(A \cap B) \times (C \cap D) = (A \times C) \cap (B \times D).$$

(b) Is the following equality always true?

$$(A \cup B) \times (C \cup D) = (A \times C) \cup (B \times D)$$

If it is, prove it. If not, provide a counterexample.