

# MAT 115: Finite Math for Computer Science

## Problem Set 3

Out: 10/18/16 Due: 10/26/2016

**Instructions:**

I leave plenty of space on each page for your computation. If you need more sheet, please attach your work right behind the corresponding problem. If your answer is incorrect but you show the computation process, then partial credits will be given. Please staple your solution and use the space wisely.

**First Name:**

**Last Name:**

**Score:**        /50

**Problem 1 GCD: 5 + 5 pts**

Use the Euclidean algorithm to find all common divisors of

(a) 10001 and 544

(b) 3510 and 652

**Problem 2 GCD: 10 pts**

Using the Euclidean algorithm, find A and B such that  $Am + Bn = \gcd(m, n)$  where  $m = 252$  and  $n = 180$ .

**Problem 3 Sets: Linear Order: 5 + 5 pts**

Let  $A = \{1, 2, 3\}$ ,  $B = \{u, v\}$  and  $C = \{m, n\}$ . Take the linear orders on  $A$  to be numeric and the linear orders on  $B$  and  $C$  to be alphabetic order. List the elements in each of the following sets in lexicographic order.

(a)  $A \times (B \times C)$  (use lex order on  $B \times C$ )

(b)  $(A \times B) \times C$  (use lex order on  $A \times B$ )

**Problem 4 Sets: Proof: 5 + 5 pts**

Prove each statement directly from the definitions.

(a) If  $A$ ,  $B$ , and  $C$  are subsets of  $U$ , then  $A \subseteq B$  and  $A \subseteq C$  implies that  $A \subseteq B \cap C$ .

(b) If  $A$ ,  $B$ , and  $C$  are subsets of  $U$ , then  $A \subseteq C$  and  $B \subseteq C$  implies that  $A \cup B \subseteq C$ .

**Problem 5 Sets: Proof: 5 + 5 pts**

(a) The following is false for subsets of a set  $U$ . Please draw Venn diagram to represent the situation being described. For all sets,  $A$ ,  $B$ , and  $C$   $(A - B) - C = A - (B - C)$ .

(b) Use the algebraic rules to show the following: [Hint:  $D - E = D \cap \bar{E}$ ]  
If  $A$  and  $B$  are subsets of  $U$ , then  $(A - B) \cup (B - A) = (A \cup B) - (A \cap B)$

**Problem 6 Practice:** We will work in group on the following in class

SF: 1.3, 1.6 (a) - (e) , 1.11(a)(b), 1.14.