

## FINITE MATH, FALL 2016 - PROBLEM SET 4

Name: \_\_\_\_\_

Use this worksheet as the cover sheet for your write-up: write your name on this page, and staple this sheet to the front of your homework packet.

You will receive no credit for submitting solutions that the grader cannot read and understand—be sure to write legibly!

**Problem 1.** Use the union rule to answer the following questions:

- (1) If  $|A| = 5$ ,  $|B| = 12$ , and  $|A \cap B| = 4$ , what is  $|A \cup B|$ ?
- (2) Suppose that  $|B| = 9$ ,  $|A \cap B| = 5$ , and  $|A \cup B| = 22$ , what is  $|A|$ ?
- (3) Suppose  $|A \cap B| = 5$ ,  $|A \cup B| = 39$ , and  $|A| = 13$ , what is  $|B|$ ?

**Problem 2.** Towards the middle of the harvesting season, peaches for canning came in three types: early, late, and extra late. These types depend on the expected date of ripening. During a certain week, the following data were recorded at a fruit delivery station:

34 trucks went out carrying early peaches;  
61 carried late peaches;  
50 carried extra late;  
25 carried early and late;  
30 carried late and extra late  
8 carried early and extra late  
6 carried all three types  
9 carried only figs (no peaches at all)

Find the following values:

- (1) How many trucks carried only late variety?
- (2) How many trucks carried only extra late?
- (3) How many trucks carried only one type of each?
- (4) How many trucks (in all) went out during the week?

**Problem 3.** Table below lists the number of head and neck injuries for 319 ice hockey players wearing either a full shield or half shield in Canadian Inter-University Athletics Union during one season.

	Half Shield ( <b>H</b> )	Full Shield ( <b>F</b> )
Head and Face Injuries ( <b>A</b> )	95	34
Concussions ( <b>B</b> )	41	28
Neck Injuries ( <b>C</b> )	9	7
Other Injuries ( <b>D</b> )	202	150

TABLE 1. Varying injuries of different sorts.

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Date: September 30th, 2016.

Using table 1, find the numbers in each set:

- (1)  $A \cap F$
- (2)  $C \cap (H \cup F)$
- (3)  $D \cap F$
- (4)  $B' \cap C'$

**Problem 4.** Write the sample space for the following experiments:

- (1) A student is asked how many points she earned on a recent 80-point test.
- (2) A person is asked the number of hours (to the nearest hour) he watched television.
- (3) A coin is tossed and a die is rolled.

**Problem 5.** A card is drawn from a well shuffled deck of cards. Find the probability of drawing the following:

- (1) A 9?
- (2) A black card?
- (3) A black 7 or a red 8?
- (4) A spade or a king?

**Problem 6.** A jar contains 3 white, 4 orange, 5 yellow, and 8 black marbles. If a marble is drawn at random, find the probability of the following:

- (1) A white marble.
- (2) A yellow.
- (3) A orange.
- (4) not black.

**Problem 7.** Decide whether the following events are mutually exclusive (meaning the sets are disjoint):

- (1) Owning a dog and owning an MP3 player.
- (2) Being a teenager and being 70 years old.
- (3) Being male and being a nurse.

**Problem 8.** One card is drawn from an ordinary deck of 52 card. Find the probability of drawing the following cards:

- (1) A 9 or a 10.
- (2) A diamond or a 7.
- (3) A black card or an ace.
- (4) A red card or a face card.

**Problem 9. Bonus!**

Prove De Morgan's second form:

$$(A \cup B)' = A' \cap B'.$$

*Hint:* We proved the first form in class. Use that proof as a guide for proving the above form.