

## Mth 21, Homework 1 on sections 2.1, 2.2

Due by Wed, Sept 13.

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Here are 8 questions for you to try. Write all your working out and answers on your own notepaper. Please use lots of space and as many pages as you want, so I can include corrections or comments - otherwise I will ask you to redo it. You do not need to write the questions, but it is very important that you show clearly any work you had to do to get your answers. Each question is worth 3 points for a total of 24.

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(1) Let  $S$  be the set  $\{1, 2, 5, 6, 7\}$ .

(a) Is  $6 \in S$ ?

(b) Is  $\{2, 3\} \subseteq S$ ?

(c) Find  $n(S)$

( $n(S)$  is the cardinality of  $S$  which just means the number of elements it has.)

(2) Let  $U = \{1, 2, 3, 4, 5, 6, 7\}$  be the universal set and  $A = \{2, 3, 5\}$ ,  $B = \{1, 2, 3, 6\}$ .

(a) Find the union:  $A \cup B$

(b) Find the intersection:  $A \cap B$

(c) Find:  $A'$

(Remember that  $A'$  is the complement of  $A$ . That's everything in  $U$  that's outside  $A$ .)

(3) Draw a Venn diagram showing the sets in question (2).

(4) If  $n(A) = 100$ ,  $n(B) = 90$  and  $n(A \cap B) = 30$  then what is  $n(A \cup B)$ ?

(5) In a deck of 52 cards, how many are diamonds or kings? Explain your answer.

(Hint: you can think of this as a union. Page 142 of the book describes playing cards.)

(6) A survey of 200 people found that 80 owned a bike, 45 owned a scooter and 20 owned both.

(a) Draw a Venn diagram for these survey results.

(b) How many own a scooter but not a bike?

(c) How many own a scooter or a bike?

(d) What percentage of the people surveyed own neither?

(7) For the same sets as in question (2):

(a) Find:  $(A \cap B)'$

(b) Find:  $A' \cup B'$

(In part (a) find the intersection of  $A$  and  $B$  first, then get the complement of that. One of De Morgan's laws says you should get the same answer to parts (a) and (b).)

(8) Draw a Venn diagram to represent each of the following, where  $A$ ,  $B$  and  $C$  are some sets depicted by circles:

(a)  $A \cap B \cap C$

(b)  $A \cup B \cup C$

(c)  $A' \cap B' \cap C'$

(Draw three overlapping circles inside a rectangle  $U$  and shade in the correct pieces.)

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If you get stuck on a question or aren't sure if you understand it:

- Go over the relevant class notes and section in the textbook.
- Check if you get the right answer for a similar odd-numbered question in the textbook (answers at the back of the book).
- Ask me about it after class.
- Come to my office hours: Mon 11:30 - 12:30, Wed 11:30 - 12:30 in CP 317.
- Go to the Math Tutorial Lab in-person in CP 303 or online.