

## CS 198:206; Introduction to Discrete Structures II

Exam I

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

- The approximate time required to complete this exam is 60 minutes.
- **For full grade, show and write all of your work, step by step. No work/ Just final answer, No credit.**
- You will get **2 points deduction** if you submit a paper without name.
- In case if you need more space, you might use the back side of the your paper. **I DO NOT ACCEPT** any other sheet attached to the exam paper.
- **Do NOT USE** calculator.
- To avoiding any missing or mistake, please read the question **carefully and completely**.



1. (4 points) i). Write the set  $J = \{x | x \text{ is an even whole number less than } 4\}$  in roster notation.

$$A = \{0, 2\}$$

- ii). Write the power set  $P(J)$ .

$$P(A) = \{\{0\}, \{2\}, \{0, 2\}, \emptyset\}$$

2. (2 points) Write the following set in set builder notation:  
 $\{1, 3, 5, \dots, 75\}$

$$B = \{x | x \in \mathbb{N}, x = 2n-1 \text{ for } n=1, 2, \dots, 33\} \quad \text{or} \quad B = \{x | x \in \mathbb{N}, x = \text{odd} < 76\}$$

3. (6 points) Let:

$$U = \{a, b, c, d, e, f, g\}, \quad A = \{a, c, e, g\}, \quad B = \{a, b, c\}, \text{ and } C = \{b, c, d, e, f\}.$$

Find:

i).  $A \cup (B - C') = \{a, b, c, e, g\}$  since:  $C' = \{a, g\}$   $B - C' = \{b, c\}$

ii).  $(C \cup A')' \cap B = \{a\}$  as:

$$A' = \{b, d, f\} \quad C \cup A' = \{b, c, d, e, f\}$$

$$(C \cup A')' = \{a, g\}$$

4. (14 points) The 65 students in a classical music lecture class were polled, with the following results:

37 like Wolfgang Amadeus Mozart  $M$

31 like Franz Joseph Haydn  $H$

21 like Mozart and Haydn

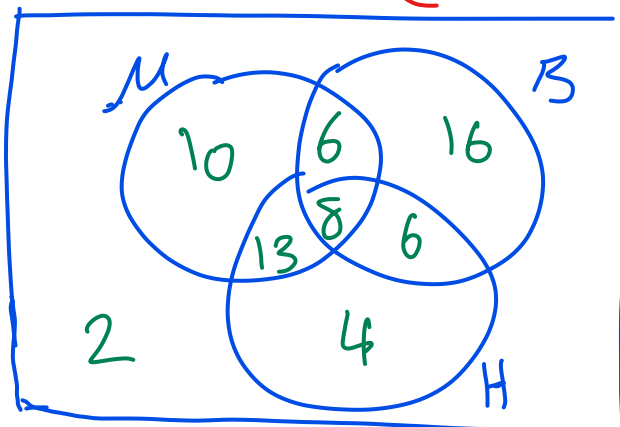
8 like all three composers.

36 like Ludwig van Beethoven  $B$

14 like Mozart and Beethoven

14 like Beethoven and Haydn

- i). Draw the proper Venn Diagram for this survey.



each value

0.5

draw the rectangular box U

Using the Venn Diagram, describe the region(s) that satisfy each of the following parts (in terms of Set Operation) and respond the questions.

How many of these students like:

ii). exactly two of these composers?

$$n((M \cap B) - H) + n((M \cap H) - B) + n((B \cap H) - M) = 13 + 6 + 6$$

iii). Mozart, but neither Beethoven nor Haydn?

$$n[(M - B) \cap (M - C)] = 10$$

iv). no more than two of these composers?.

$$n[U - (M \cap B \cap C)] = 65 - 8$$

5. (4 points) Sakda runs a basketball program in California. On the first day of the season, 64 young women showed up and were categorized by age level and by preferred basketball position as shown in the accompanying table.

	Position			Totals
	Guard (G)	Forward (F)	Center (N)	
Junior High (J)	9	6	4	19
Age Senior High (S)	12	5	9	26
College (C)	5	8	2	15
Totals	26	19	15	60

Using the set labels (letters) in the table and find the number of players in the following set.  
 $S' \cap (G \cup N)$

$$n(G \cup N) = 26 + 15 = 41$$

$$n(S') = 19 + 15 = 34$$

$$n(S' \cap (G \cup N)) = 41 - 12 - 9 = 20$$

<--- subtracting the # of senior high and center from  $n(G \cup N)$

Total: 30 Points

Good Luck! :)