

HW 1 — Due: Aug 30, 5 PM

Lecturer: Prapun Suksompong, Ph.D.

Instructions

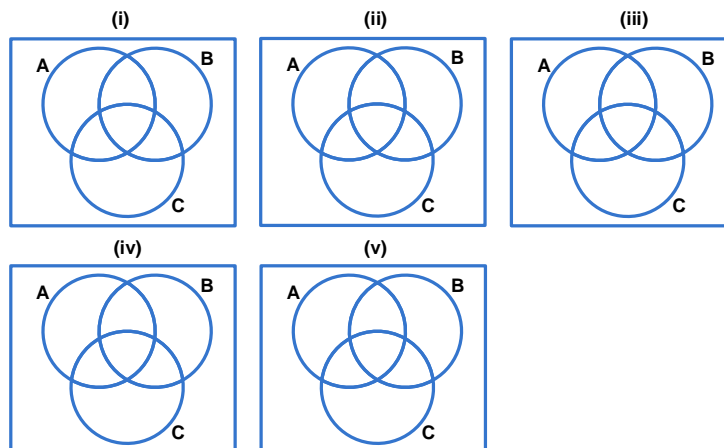
- (a) (1 pt) This assignment has three pages. Do not staple or use paper clip. Your submitted work will be scanned using automatic document feeder.
- (b) (2 pt) Write your first name and the last three digit of your student ID on the upper-right corner of *every* submitted page.
- (c) (7 pt) It is important that you try to solve all problems. For each part, write your explanation/derivation and answer in the space provided.

The extra questions at the end are optional.

- (d) Late submission will be heavily penalized.

Problem 1. (Set Theory) For this problem, only answers are needed; you don't have to describe your solution.

- (a) In the Venn diagrams below,



shade the region that corresponds to the following events:

- (i) A^c
- (ii) $A \cap B$
- (iii) $(A \cap B) \cup C$
- (iv) $(B \cup C)^c$
- (v) $(A \cap B)^c \cup C$

[Montgomery and Runger, 2010, Q2-19]

- (b) Let $\Omega = \{0, 1, 2, 3, 4, 5, 6, 7\}$, and put $A = \{1, 2, 3, 4\}$, $B = \{3, 4, 5, 6\}$, and $C = \{5, 6\}$. Find

- (i) $A \cup B$
- (ii) $A \cap B$
- (iii) $A \cap C$
- (iv) A^c
- (v) $B \setminus A$

Problem 2. For this problem, only answers are needed; you don't have to provide explanation.

For each of the sets provided in the first column of the table below, indicate (by putting a Y(es) or an N(o) in the appropriate cells of the table) whether it is “finite”, “infinite”, “countable”, “countably infinite”, “uncountable”.

Sets	Finite	Infinite	Countable	Countably Infinite	Uncountable
$\{1\}$					
$\{1, 2\}$					
$[1, 2]$					
$[1, 2] \cup [-1, 0]$					
$\{1, 2, 3, 4\}$					
the power set of $\{1, 2, 3, 4\}$					
the set of all real numbers					
the set of all real-valued x satisfying $\cos x = 0$					
the set of all integers					
$(-\infty, 0]$					
$(-\infty, 0] \cap [0, +\infty)$					

Problem 3. Each of the possible five outcomes of a random experiment is equally likely. The sample space is $\{a, b, c, d, e\}$. Let A denote the event $\{a, b\}$, and let B denote the event $\{c, d, e\}$. Determine the following:

(a) $P(A)$

(b) $P(B)$

(c) $P(A^c)$

(d) $P(A \cup B)$

(e) $P(A \cap B)$

[Montgomery and Runger, 2010, Q2-54]

Don't forget to write your first name and the last three digit of your student ID on the upper-right corner of *every* submitted page.