

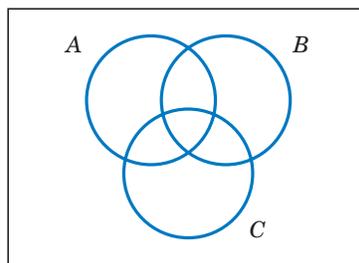
HW 1 — Due: Aug 26, 9:19 AM (in tutorial session)

*Lecturer: Prapun Suksompong, Ph.D.***Instructions**

- (a) ONE part of a question will be graded (5 pt). Of course, you do not know which part will be selected; so you should work on all of them.
- (b) It is important that you try to solve all problems. (5 pt)  
The extra questions at the end are optional.
- (c) Late submission will be heavily penalized.

**Problem 1. (Set Theory)**

- (a) Three events are shown on the Venn diagram in the following figure:



Reproduce the figure and shade the region that corresponds to each of 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  $A \cup B$ ,  $A \cap B$ ,  $A \cap C$ ,  $A^c$ , and  $B \setminus A$ .

For this problem, only answers are needed; you don't have to describe your solution.

**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                                |        |          |           |                    |             |
| $(-\infty, 0]$   |        |          |           |                    |             |
| $(-\infty, 0] \cap [0, +\infty)$                       |        |          |           |                    |             |