

NATIONAL UNIVERSITY OF SINGAPORE
DEPARTMENT OF STATISTICS & DATA SCIENCE
ST2334 PROBABILITY AND STATISTICS
SEMESTER I, AY 2025/2026

Tutorial 01

Please work on the questions before attending the tutorial.

Exam-Like Questions

1. **MULTIPLE CHOICE: CHOOSE ONE ANSWER ONLY**

$((A \cup B) \cap C)'$ is the same as

- (a) $(A' \cap C') \cap (B' \cap C')$
- (b) $(A' \cap C') \cup (B' \cap C')$
- (c) $(A' \cup C') \cap (B' \cup C')$
- (d) $(A' \cup C') \cup (B' \cup C')$

2. **FILL IN THE BLANK**

The English alphabet has 5 vowels and 21 consonants, for a total of 26 letters. If a sample of 3 letters are selected without replacement, how many of the possible samples has at least 1 vowel?

ANSWER: _____

3. **FILL IN THE BLANK**

How many ways can 4 men and 3 women sit in a row if no two women are allowed to sit together?

ANSWER: _____

4. **FILL IN THE BLANK**

A contractor wishes to build 9 houses, each with a different design in 9 plots of land. In how many ways can these houses be placed on a street if 6 plots are to be on the South side of the street and 3 plots are to be on the North side? (**Note:** The 9 plots are fixed.)

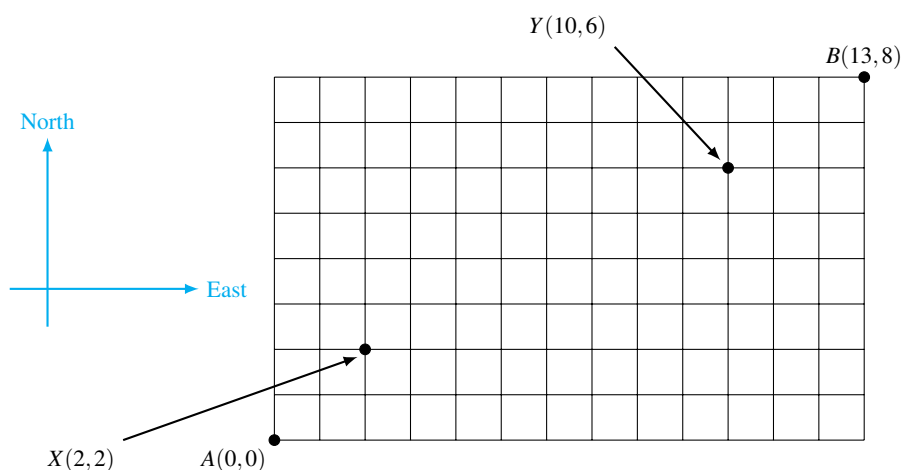
ANSWER: _____

Long Form Questions

1. The NUS library has five copies of a certain text on reserve. Two copies (1 and 2) are first editions, and the other three (3, 4 and 5) are second editions. A student examines these books in random order, stopping only when a second edition has been selected. One possible outcome is 5, and another is 213.

- (i) List the outcomes in the sample space S .
- (ii) Let A denote the event that exactly one book must be examined. List the outcomes in A .
- (iii) Let B be the event that book 5 is the one selected. List the outcomes in B .
- (iv) Let C be the event that book 1 is not examined. List the outcomes in C .
- (v) List the outcomes in $A \cap B$, $A \cup B$, and $A \cap B \cap C$ respectively. Are A and B mutually exclusive?

2. Consider the digits 0, 2, 4, 6, 8 and 9. If each digit can be used only once,
- how many three-digit numbers can be formed?
 - how many of these numbers in (i) are odd numbers?
 - how many of these odd numbers in (ii) are greater than or equal to 620?
3. An exam paper consists of seven questions. Candidates are asked to answer five questions. Find the number of ways to select five questions (in each of the following cases) if
- there are no restrictions;
 - the first two questions must be answered;
 - at least one of the first two questions must be answered; and
 - exactly two from the first three questions must be answered.
4. Little Red Riding Hood lives at point $A : (0,0)$, and wants to visit her grandmother at point $B : (13,8)$. At each step, she can only go East (Right) or North (Up) along the grid as shown below. The Big Bad Wolf lives at $Y : (10,6)$.



- How many ways can Little Red Riding Hood go to visit her grandmother regardless of whether she will pass by the Big Bad Wolf?
- How many ways can she go to visit her grandmother avoiding the Big Bad Wolf?
- Little Red Riding Hood wants to buy a gift for her grandmother at $X : (2,2)$. How many ways can she go to visit her grandmother stopping by X but avoiding Y ?

Answers to some Long Form Questions

2. (i) 100; (ii) 16; (iii) 7.
3. (i) 21; (ii) 10; (iii) 20; (iv) 12.
4. (i) 203490; (ii) 123410; (iii) 44556.