NATIONAL UNIVERSITY OF SINGAPORE
DEPARTMENT OF STATISTICS & APPLIED PROBABILITY

ST2334 PROBABILITY AND STATISTICS

SEMESTER I, AY 2022/2023

Tutorial 01

This set of questions will be discussed by your tutors during the tutorial in Week 3.

Please work on the questions before attending the tutorial.

1. The NUS library has five copies of a certain text on reserve. Two copies (1 and 2) are first edition, and the other three (3, 4 and 5) are second edition. 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.

   (a) List the outcomes in the sample space S.

   (b) Let A denote the event that exactly one book must be examined. What outcomes are in A?

   (c) Let B be the event that book 5 is the one selected. What outcomes are in B?

   (d) Let C be the event that book 1 is not examined. What outcomes are in C?

   (e) Perform some event operations based on these events.

2. What can you conclude about the events A and B if

   (a) $A \cup B = A$;

   (b) $A \cap B = A$.

3. How many ways to seat 4 men and 6 women in a row if the 6 women must sit next to each other?

4. Consider the digits 0, 2, 4, 6, 8 and 9. If each digit can be used only once,

   (a) how many three-digit numbers can be formed?

   (b) how many of these numbers in (a) are odd numbers?

   (c) how many of these odd numbers in (b) are greater than or equal to 620?

5. An exam paper consists of seven questions. Candidates are asked to answer five questions. Find the number of choices of the five questions if

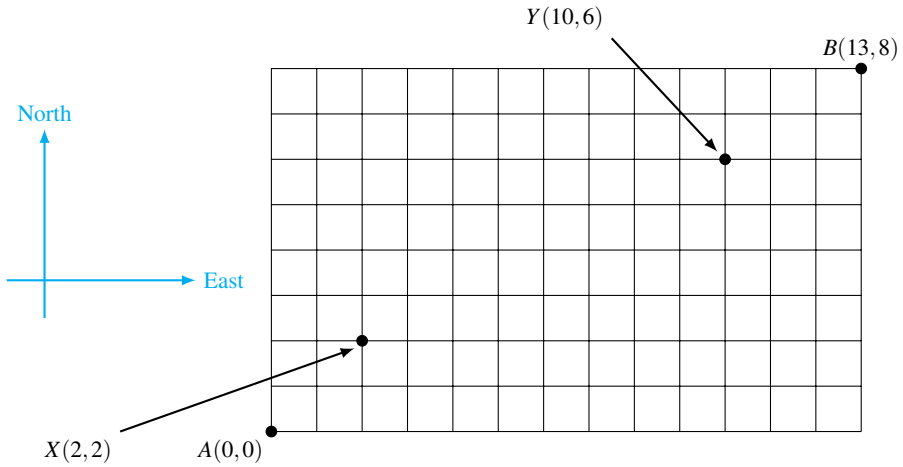
   (a) no restriction on the choices;

   (b) the first two questions must be answered;

   (c) at least one of the first two questions must be answered and

   (d) exactly two from the first three questions must be answered.

6. Red Riding Hood lives at point $A : (0,0)$ wants to visit her grandmother at point $B : (13,8)$, and Big Bad Wolf lives at $Y : (10,6)$. At each step, she can only go East (Right) or North (Up) along the grid as shown below.



(a) How many ways can she go to visit her grandmother regardless of whether she will pass by Big Bad Wolf?

(b) How many ways can she go to visit her grandmother avoiding the Big Bad Wolf?

(c) 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

1. (a) $S = \{123, 124, 125, 13, 14, 15, 213, 214, 215, 23, 24, 25, 3, 4, 5\}$; (b) 16;

(b) $A = \{3, 4, 5\}$;

(c) $B = \{5, 15, 25, 125, 215\}$;

(d) $C = \{23, 24, 25, 3, 4, 5\}$;

(e) $A \cap B = \{5\}$, $A \cup B = \{3, 4, 5, 15, 25, 125, 215\}$, $A \cap B \cap C = \{5\}$.

1. (a) $B \subset A$;

(b) $A \subset B$.

3. 86400.

4. (a) 100;

(c) 7.

5. (a) 21;

(b) 10;

(c) 20;

(d) 12.

6. (a) 203490;

(b) 123410;

(c) 44556.