Assignment 4

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***Abstract*—This document contains the solution to Example 14 of Chapter 16 (Probability) in the NCERT Class 11 Exemplar.**

Example 14: On her vacations Veena visits four cities (A,B,C and D) in a random order. What is the probability that she visits,

(i) A before B?
(ii) A before B and B before C?
(iii) A first and B last?
(iv) A either first or second?
(v) A just before B?

Solution: Let S denote the sample space of all possible ways of visiting these 4 trips, $n(S) = 4!$.

(i) Let E_1 denote the event when Veena visits A before B.

$$\Pr\left(E_1\right) = \frac{n(E_1)}{n(S)} \tag{1}$$

$$n(E_1) = \frac{4!}{2!} \tag{2}$$

$$\Pr\left(E_1\right) = \frac{1}{2} \tag{3}$$

(ii) Let E_2 denote the event when Veena visits A before B and B before C.

$$\Pr\left(E_2\right) = \frac{n(E_2)}{n(S)} \tag{4}$$

$$n(E_2) = \frac{4!}{3!} \tag{5}$$

$$\Pr\left(E_2\right) = \frac{1}{6} \tag{6}$$

(iii) Let E_3 denote the event when Veena visits A first and B last.

$$\Pr\left(E_3\right) = \frac{n(E_3)}{n(S)} \tag{7}$$

$$n(E_3) = 2! \tag{8}$$

$$\Pr\left(E_3\right) = \frac{1}{12} \tag{9}$$

(iv) Let E_4 denote the event when Veena visits A either first or second.

$$\Pr\left(E_4\right) = \frac{n(E_4)}{n(S)} \tag{10}$$

$$n(E_4) = \binom{2}{1} \times 3! \tag{11}$$

$$\Pr\left(E_4\right) = \frac{1}{2} \tag{12}$$

(v) Let E_5 denote the event when Veena visits A just before B.

$$\Pr\left(E_5\right) = \frac{n(E_5)}{n(S)} \tag{13}$$

$$n(E_5) = 3! \tag{14}$$

$$\Pr\left(E_5\right) = \frac{1}{4} \tag{15}$$