

ECS 315: In-Class Exercise # 3

Instructions

1. Separate into groups of no more than three students each. **The group cannot be the same as any of your former groups.**
2. **Write down all the steps** that you have done to obtain your answers. You may not get full credit even when your answer is correct without showing how you get your answer.
3. **Do not panic.**

Date: 27 / 08 / 2019		
Name	ID (last 3 digits)	
Prapun	5	5

1) A random experiment has 24 **equiprobable** outcomes:

$$\Omega = \{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x\}$$

Let A denote the event $\{a, b, c, d, e, f, g, h, i, j, k, l\}$, and let B denote the event $\{i, j, k, l, m, n, o, p\}$.

Determine the following:

$$(a) P(A) = \frac{|A|}{|\Omega|} = \frac{12}{24} = \frac{1}{2}$$

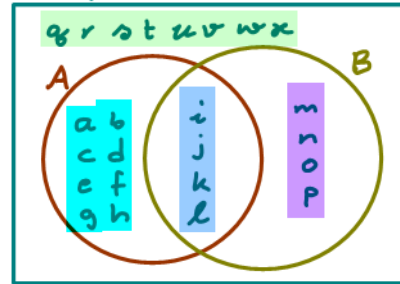
$$(b) P(A \cup B^c) = \frac{|A \cup B^c|}{|\Omega|} = \frac{|\Omega| - |(A \cup B^c)^c|}{|\Omega|} = 1 - \frac{|A^c \cap B|}{|\Omega|} = 1 - \frac{|B \setminus A|}{|\Omega|}$$

$$= 1 - \frac{|m, n, o, p|}{24}$$

$$= 1 - \frac{4}{24} = \frac{5}{6} \approx 0.8333$$

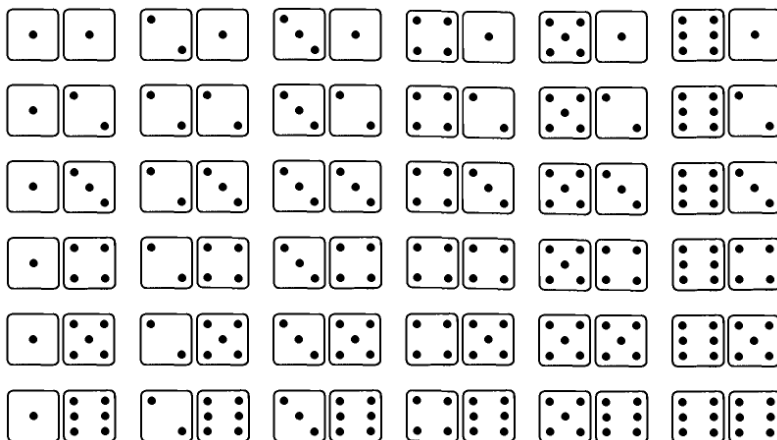
Alternatively, $B^c = \{a, b, c, d, e, f, g, h, q, r, s, t, u, v, w, x\}$
 $A \cup B^c = \{a, b, c, d, e, f, g, h, i, j, k, l, q, r, s, t, u, v, w, x\}$
 8 outcomes + 4 outcomes + 8 outcomes
 $|A \cup B^c| = 20$
 $P(A \cup B^c) = \frac{|A \cup B^c|}{|\Omega|} = \frac{20}{24} = \frac{5}{6}$

The size of any set can be counted directly once we obtain the Venn diagram.



The solution

2) Roll two (fair) dice. What is the probability that the sum is greater than 9?



Let A be the event that the sum is greater than 9. Consider all possible outcomes. The corresponding sums are

2	3	4	5	6	7
3	4	5	6	7	8
4	5	6	7	8	9
5	6	7	8	9	10
6	7	8	9	10	11
7	8	9	10	11	12

Among the 36 outcomes, only 6 of them satisfy the condition "sum > 9".

Therefore,

$$P(A) = \frac{|A|}{|\Omega|} = \frac{6}{36} = \frac{1}{6}$$