EES 315: In-Class Exercise # 4

Date: 28 / 8 / 2020			
Name		ID (last 3 digits)	

Instructions

1. Work alone or in a group of no more than three students. For group work, **the group cannot be the same as any of your former groups in this class.**
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. Only one submission is needed for each group.
4. You have two choices for submission:
   (a) Online submission via Google Classroom
      - PDF only.
      - Only for those who can directly work on the posted files using devices with pen input.
      - Paper size should be the same as the posted file.
      - No scanned work, photos, or screen capture.
      - Your file name should start with the 10-digit student ID of one member.
         (You may add the IDs of other members, exercise #, or other information as well.)
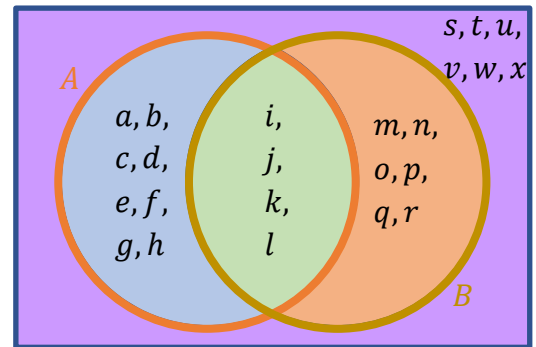   (b) Hardcopy submission
5. **Do not panic.**

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

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

Let A denote the event $\{a,b,c,d,e,f,g,h,i,j,k,l\}$, and

let B denote the event $\{i,j,k,l,m,n,o,p,q,r\}$.
 1 2 3 4 5 6 7 8 9 10

Determine the following:

(a) $P(B) = \dfrac{|B|}{|\Omega|} = \dfrac{10}{24} = \dfrac{5}{12} \approx 0.4167$
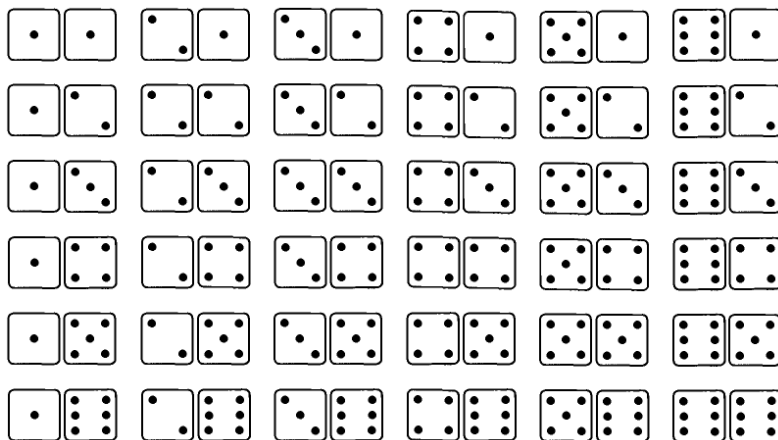
$$|A\backslash B| = \{a,b,c,d,e,f,g,h\}$$
 1 2 3 4 5 6 7 8

(b) $P\left(A^c \cup B\right) = \dfrac{|A^c \cup B|}{|\Omega|} = \dfrac{|\Omega|-|A\backslash B|}{|\Omega|} = \dfrac{24-8}{24} = \dfrac{16}{24} = \dfrac{2}{3} \approx 0.67$

Alternatively, $A^c \cup B = \{i,j,k,l,m,n,o,p,q,r,s,t,u,v,w,x\}$.
 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Therefore, $P(A^c \cup B) = \dfrac{|A^c \cup B|}{|\Omega|} = \dfrac{16}{24}$.

2) Roll two (fair) dice. What is the probability that the sum is less than 7?

Let A be the event that the sum is less than 7.

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 15 of them satisfy the condition "sum < 7".

Therefore, $P(A) = \dfrac{|A|}{|\Omega|} = \dfrac{15}{36} = \dfrac{5}{12} \approx 0.4167$