4COSCOO2W Mathematics for Computing,

4CCGD002W Mathematics for Games Development and

4BUIS002W Business Mathematics

TUTORIAL 10 TASKS

A**im:** To practice various problem-solving tasks related probability: independent probability, conditional probability.

Pre-tutorial work (independent study):

1. **Read:** Pages 403 – 406, (sections 31.1 - 31.2) and Pages 408-409 (section 31.3-31.4) from Croft, T and Davison R **(2016)** *Foundation maths*, 5th ed. Harlow: Pearson.
2. Practice tasks for the tutorial are given below.

Task 1.

A fair die is rolled twice and we obtain two numbers X_1= result of the first roll, and X_2= result of the second roll. Let A and B be the events defined as follows: A is "$X_1 < X_2$"; B is "You observe a 6 at least once".

a. Define the probability space, D, in set builder notation and its cardinality.
b. Find the cardinality of event A represented as a subset of the probability space D. Find the probability of event A
c. Find the cardinality of event B represented as a subset of the probability space D. Find the probability of event B

Task 2.

A fair die is rolled twice and we get two numbers X = result of the first roll and Y = result of the second roll.

a) What is the probability that X = 4
b) What is the probability that Y = 4
c) What is the probability that both X= 4 and Y = 4

   For the problems below let A be the event that "X =4 or Y =4" and B be the event that "X + Y=7".
d.) What is P(B) ?
e.) What is P(A $\cap$ B) ?
f.) Given that we know B, what is the probability of A?

Task 3.

Consider a family that has two children. We are interested in the children's genders. Our sample space is $S=\{(G,G),(G,B),(B,G),(B,B)\}$ (G for Girl, B for Boy).

. Also assume that all four possible outcomes are equally likely.

   a. What is the probability that both children are girls given that the first child is a girl?
   b. We ask the father: "Do you have at least one daughter?" He responds "Yes!" Given this extra information, what is the probability that both children are girls? In other words, what is the probability that both children are girls given that we know at least one of them is a girl?