Djilali Bounaâma University, Khemis Miliana
Faculty of Material Sciences and Computer Science
Computer Science Department

2nd Year Computer Science
Module: Graph Theory

**Tutorial Session (2)**

**Exercise 1:**

In a graph $G = (X, U)$, the following four properties are always satisfied:

1. $\sum_{x \in X} d_G^-(x) = \sum_{x \in X} d_G^+(x)$.
2. $\sum_{x \in X} d_G(x) = 2|U|$.
3. $\sum_{x \in X} d_G(x)$ is an even number.
4. There is an even number of vertices with odd degree.

**Exercise 2:**

A football league contains 7 clubs. Due to time constraints, it is decided that each club will only play half of the possible matches. How can the tournament be organized?

**Exercise 3:**

How can you draw 5 segments on a sheet of paper so that each segment intersects exactly 3 others?

**Exercise 4:**

Is it possible to construct a simple graph $G = (X, U)$ with 4 vertices and 7 edges?

**Exercise 5:**

In a group of twenty children, is it possible that seven of them each have exactly three friends, nine of them have exactly four friends, and four of them have exactly five friends?