THE GEORGE WASHINGTON UNIVERSITY
WASHINGTON, DC

CS 2312: Lab 07

SCHOOL OF ENGINEERING & APPLIED SCIENCE

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Counting Seams

Consider the graph whose edges are the seams of a standard soccer ball and whose vertices are the places where these seams meet. Each vertex in this graph lies at the corner of one of the 12 black pentagons and has degree 3.

How many edges are in this graph?

Three-Graph

We say that a connected graph G with at least two vertices is a three-graph if every vertex is of degree at most 3 and it has a vertex of degree exactly 3. We say that G is a strict three-graph if it is a three-graph and every vertex has degree 3.

1) Prove or disprove that there exists a three-graph G with an odd number of vertices.
2) Prove or disprove that there exists a strict three-graph G with an odd number of vertices.

Connected Graph

Prove that for a graph $G = (V, E)$ or its complement $\overline{G}$, denoted by $\overline{G} = (V, E')$, at least one of the two graphs must be connected.

$\overline{G}$ is defined such that $V' = V$ and $\{u, v\} \in E' \Leftrightarrow \{u, v\} \notin E$