Discrete Math
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Quiz 8, Points: 8, Time: 10min
Date: 03.12.2025

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**Name:** _____

**Problem 1.** *Define the line graph $L(G)$ of a graph and prove that the number of edges in $L(G)$ equals $\sum_{v \in V(G)} \binom{d_G(v)}{2}$ where $d_G(v)$ is the degree of $v$ in $G$.*

*Solution.* For any vertex $v$ all the edges incident to $v$ are pairwise connected by an edge in $L(G)$. This contributes $\binom{d_G(v)}{2}$ edges to the total number of edges in $L(G)$. Furthermore, every edge $\{e, e'\}$ in $L(G)$ is contributed this was from the unique vertex in $e \cap e'$. The total count follows by summing the contribution from each vertex. $\square$