

MATH 239 — Assignment 1, Question 3

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1. For any graph with at least two vertices, assume that no two vertices have the same degree. This means that for a graph with n vertices, we can map a distinct degree to each one:

- Vertex A_1 will have a degree of 0
- Vertex A_2 will have a degree of 1
- \vdots
- Vertex A_n will have a degree of $n - 1$

However, if vertex A_n has $n - 1$ edges, this means that A_n is neighbours with every other vertex, including A_1 , but that can't happen because A_1 has zero edges — a contradiction.

Therefore, any graph with at least 2 vertices will contain two vertices of the same degree.