

Combinatorics, Math 145
Homework four

1. Show that a graph G with at least two vertices has at least two vertices with the same number of neighbors.
2. Is it possible that the following lists are the degrees of the vertices of a graph? If so draw an example of such graph. Else explain why it is not possible.
 - a) 2, 2, 2, 3
 - b) 2, 2, 4, 4, 4
 - c) 1, 2, 2, 3, 4
3. A mouse intends to eat a $3 \times 3 \times 3$ cube of cheese, it begins at a corner and eats the whole of a $1 \times 1 \times 1$ cube before going to an adjacent one. Can the mouse end in the center?
4. For which values of n is it true that the complete graph K_n has an Eulerian walk?
5. Find a Hamiltonian cycle in the graph formed by the edges and vertices of an ordinary cube.
6. Construct five different connected graphs with 8 vertices each and every vertex of degree 3.