

Math589 Homework 1

Note: To submit the k -th homework, simply put your files in the folder `HW k` on CoCalc, and it will be collected on the due day.

1. You should have received an invitation email from CoCalc. Do the following:
 - (a) Register an account with your **school email**. (Let me know if you prefer using a different email address.)
 - (b) Open the project whose name contains **2019SMath589**.
 - (c) Open `HW1 > name.txt`.
 - (d) Enter your name in `name.txt` and click on **Save**.

[This assignment can only be done electronically.]

2. Try to create a simple graph G on n vertices such that the degrees for each vertex are distinct. For each fixed n , find an example or prove that such graph does not exist.

Solution. For any n , we show that such graph does not exist.

Let G be a simple graph on n vertices. The degree of a vertex can be $0, 1, \dots, n - 1$. Since there are n vertices, there is exactly one vertex of degree k for each $k = 0, 1, \dots, n - 1$. Let u be the vertex of degree 0. Then u is not adjacent to any vertex. Let v be the vertex of degree $n - 1$. Then v is adjacent to any vertex. This is a contradiction since u and v can not occur simultaneously.