MAT 145, Spring 2020
Homework 6
Due before 12:10 on Wednesday, May 13

Please write the homework solutions in connected sentences and explain your work. Mark the answers to each question. Scan or take pictures of your homework and upload it to Gradescope before due time.

1. (20 points) A graph has two connected components with m and $n - m$ vertices. What is the maximal possible number of edges in this graph?

2. (20 points) Use problem 1 to prove that a graph with n vertices and more than $\binom{n-1}{2}$ edges is connected.

3. (20 points) Are there graphs on 6 vertices with degrees (a) $0, 1, 2, 3, 4, 5$? (b) $2, 3, 3, 3, 3, 3$? Either draw the graphs or prove that they do not exist.

4. (20 points) Prove that in any graph (with at least 2 vertices) there are two vertices of the same degree.

5. (20 points) Which of the following graphs have Eulerian walks? Find an Eulerian walk or prove that it does not exist.