CS105 (DIC on Discrete Structures)
Exercise problem set 11

Solve the following questions from Douglas West's book, *Introduction to Graph Theory, 2nd Edition.*

1. Simple questions: Exercise 1.1.4, 1.1.9

2. Medium-level questions: Exercises 1.1.19, 1.1.41, 1.1.42, 1.2.20, 1.3.20, 1.3.31, 1.3.32

3. Slightly harder/longer questions: Exercises 1.3.13, 1.3.50

4. Simple: There are 100 circles forming a connected figure on the plane. Can this figure be drawn without lifting the pencil off the paper or drawing any part of any circle twice? Why or why not?

5. Not-so-simple: Prove or disprove: If a simple graph G with n vertices has more than $(n-1)(n-2)/2$ edges, then it has only one connected component.

6. Let G be a graph with vertices V and edges E with no self-loops. Show that G has a bipartite sub-graph with at least $E/2$ edges. Give two proofs: one by maximality and contradiction and another by an algorithmic construction.