Problem Set #3

Due: Tuesday, October 4

Reading: Chapter 6 on graph theory in the on-line text (see the class homepage for the URL), pages 73-87

Problems:

1. Page 54, problem 5b.
2. Page 64, problem 9, part a,b,d,e,f.
3. Page 72, problem 5. (Look at the similar example on page 69.)
5. Page 81, problem 3.
7. Let $K_n$ be the complete graph on $n$ vertices. For which $n$ does $K_n$ have an Euler cycle? Explain your reasoning.
8. (i). Give an example of a connected graph such that the removal of any edge leaves the graph connected.
   (ii). Give an example of a connected graph such that the removal of any edge leaves the graph disconnected.
   (ii). Give an example of a graph with 7 vertices where the degrees of the vertices are 1, 2, 2, 2, 2, 3 and 4.
9. Consider the following graph $G$.

   ![Graph](image)

   Does $G$ have an Euler cycle? Why or why not? If $G$ has an Euler cycle, what is it?
10. Prove that if a connected graph $G$ has $n \geq 2$ vertices and has no cycles, then $G$ has exactly $n-1$ edges. (You might use induction on $n$, but don’t have to.)