MATH 454/ 553 : Homework #2

Due Thursday, 9/11, in class before the lecture starts.

Re-read the " 'Why and How' of Homework" section of the course information sheet for some advice on the HWs for this course.

Always remember that homework is NOT meant to be an examination, it is meant to assist in your learning and development. If you need help with it, don't hesitate to ask. You can contact me during office hours, or through email.

All problems require explicit and detailed proofs/ arguments/ reasons. Solutions should be written clearly, legibly, and concisely, and will be graded for both mathematical correctness and presentation. Points will be deducted for sloppiness, incoherent or insufficient explanation, or for lack of supporting rationale.

You are allowed to discuss the homework problems with no one except your classmates, the TA, and the instructor. However, the solutions should be written by you and you alone in your own words. Any incident of plagiarism/ cheating (from a person or from any online resource) will be strictly dealt with.

If you discuss the problems with anyone, you are required to note their name at the top of your HW submission under a subtitle "Collaborator:" or "Discussed with:".

Problems 1 and 2 are compulsory for all students. Math 454 students submit a total of 4 problems while Math 553 students submit a total of 5 problems.

1. Solve both of following two short questions.
(a) Let G be connected graph. Prove that: A vertex w in G is a cut-vertex if and only if there exist two vertices u and v in G such that every path between u and v passes through w.
(b) Show that every graph (containing at least one edge) has at least two vertices that are not cut-vertices.

2. If G_1 and G_2 are complementary graphs (that is, they are complements of each other) then prove that at least one of them must be connected.

3. Textbook exercise 1.1.12.

4. Textbook exercise 1.1.26.

5. Textbook exercise 1.2.26.

6. Textbook exercise 1.2.42.