MATH 634, Spring 2013
Homework 1
due 4:30pm on Wednesday, February 6.

Background reading: Pearls in Graph Theory, Sections 1.1 and 1.2.

Thoroughly read the class web page including the syllabus and schedule. This should answer all the questions that you may have about the class.

Follow the posted homework guidelines when completing this assignment.

1-1. Problem **1-1** must be completed online **before class** on Wednesday 2/6 for credit.

(a) Create an account on Wikipedia if you do not already have one. After reading

http://en.wikipedia.org/wiki/Wikipedia:Username_policy,

choose a unique username to represent yourself on Wikipedia. They suggest that you may wish to choose a username that cannot be traced back to you in real life.

(b) Email me at chanusa@qc.cuny.edu with the following four things: (1) Your name, (2) your class (Math 634), (3) the email address where you are best contacted, (4) your wikipedia username, and (5) if you are an undergraduate, your expected graduation year. Thanks!

(c) Take the syllabus quiz on Blackboard. **Retake** the quiz as necessary to earn a score of 100%.

Problems **1-2** through **1-5** should be written up (or typed) and handed in as class starts on Wednesday 2/6:

1-2. Write a paragraph or two giving an example of where you have seen graphs in real life. (Do not use the examples from class unless you have a unique perspective.) In your example, **explain** what corresponds to the abstract concepts of vertices, edges, and vertex degree, and **discuss** whether a vertex can have a degree of zero or one.

1-3. Seven students go on vacations. They decide that each will send a postcard to three of the others. Is it possible that every student receives postcards from precisely the three to whom he sends postcards?
[*Note: If you intend to use graph theory, explain why your reasoning applies.*]

1-4. In parts (a) and (b) below, do not apply Theorem 1.1.2. [*Hint: You will need to find two families of graphs that give an answer for every possible value of n.*]

- Prove that for every even number $n \geq 4$, there exists a graph with n vertices, all of which have degree 3.
- Prove that for every odd number $n \geq 5$, there exists a graph with $n+1$ vertices, n of which have degree 3.

1-5. Find two graphs that have at least five vertices and that have **the same** degree sequence, where one of them **is** a tree and where the other **is not** a tree.