Discrete Math Homework 9
Due Monday, March 6 at the beginning of class

General instructions:

- Use standard size paper (8.5 by 11).
- Answer each question in order using a single column.
- Be neat. If we cannot read your solution it is wrong.
- Show your work. If you just write an answer, you will get minimal credit even if the answer is correct.

Exam 1 is Friday, March 10 and covers all the material from Rosen sections: 1.6, 1.7, 1.8, 2.1, 2.2, 2.3, 2.4, 2.5, 3.2

Rosen section 2.5.

Question A) Rosen 2.5 Exercise 2 a, d, f (p. 176)

Question B) Rosen 2.5 Exercise 10 (p. 176)

Question C) Show that the union of two uncountable sets is uncountable. (Do a proof by contradiction.)

Question D) Show that the set of finite bit strings is countable. (Finite bit strings are things like "01", "101001", and the empty string "". Show that you can list them all.)

Question E) Show that the set of infinite bit strings is uncountable.

Rosen section 3.2

Question F) Show that $x+3 \in O\left(x^3\right)$

Question G) Show that $x^3 \notin O\left(x+3\right)$

Question H) Show that $2x^4 \in \Theta\left(x^4\right)$ (Note: you have to show it is both upper and lower bounded.)

Question I) Rosen 3.2 Exercise 4 (p. 216)

Question J) Rosen 3.2 Exercise 22 (p. 217) (You are not required to prove the BigO relation between the functions, but you should think carefully about the order you list the functions. Looking at the value of the functions for small values of x may not give you the correct order.)

You may choose to solve one (and only one) of the following Extra Credit Problems. If you submit more than one, only the first will be graded.

Extra Credit 1) Rosen 2.5 Exercise 9 (p. 176)
Extra Credit 2) Rosen 2.5 Exercise 26 (p. 177)