Introduction

• Discuss syllabus

  – MCS-236 is a WRITD course that teaches you
    * how to write proofs
    * basic graph theory
  – The course consists of four components:
    * homework
    * proof portfolio (mastery type)
    * paper exposition (draft & final)
    * exams (2 intra-term, 1 final)
  – Participation extra credits can raise your grade by one full letter!

• Applications of graph theory to CS

  – Theoretical Computer Science
    * (multi)digraphs & finite automata
  – Compiler
    * syntax tree & parsing
    * graph coloring & register allocation
    * immediate dominators in a flowgraph & global flow analysis and program optimization
  – Programming & Software Engineering:
    * the dependency graph & make
    * flowchart
    * UML diagram
– Operating Systems
  * resource allocation graph & the deadlock problems
  * digraph & directory structure
  * wait-for graph & deadlock detection in distributed computing
  * process tree
– VLSI design: planarity, thickness of graphs, MST
– Graph Coloring: resource allocation, scheduling, time tabling, garbage collection, etc.
– The Internet graph
– etc.

• Some reminders:
  – Definitions of floor and ceiling.
  – The expression $A \leq B \leq C$ says that $A \leq B$ and $B \leq C$.
  – Manipulation of inequality:
    If $a \leq b$ and $a' \leq b'$ then $a + a' \leq b + b'$.
    If $a \leq b$ and $c > 0$ then $ac \leq bc$.
    If $a \leq b$ and $c < 0$ then $ac \geq bc$. 