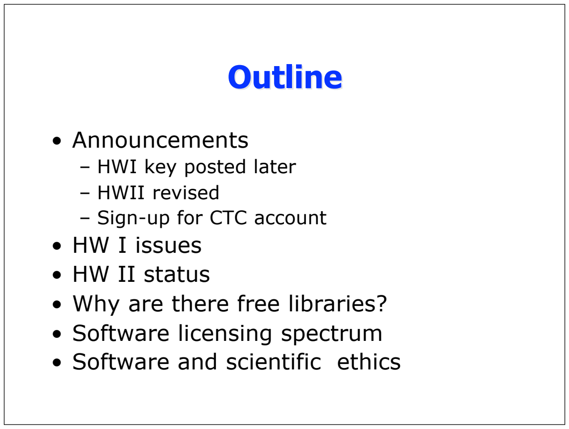
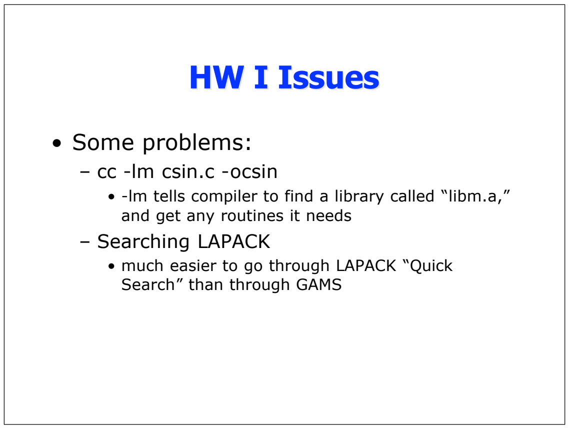


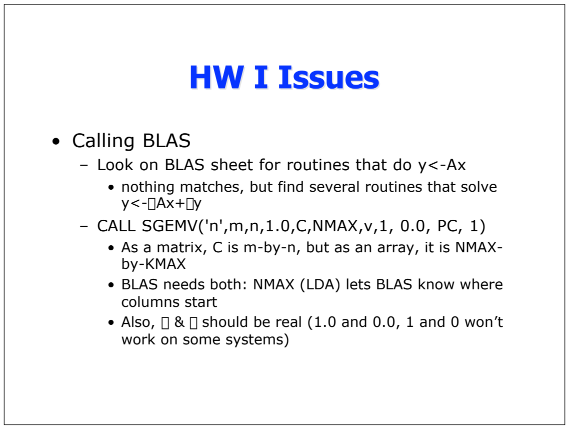
Outline

- Announcements
  - HWI key posted later
  - HWII revised
  - Sign-up for CTC account
- HW I issues
- HW II status
- Why are there free libraries?
- Software licensing spectrum
- Software and scientific ethics



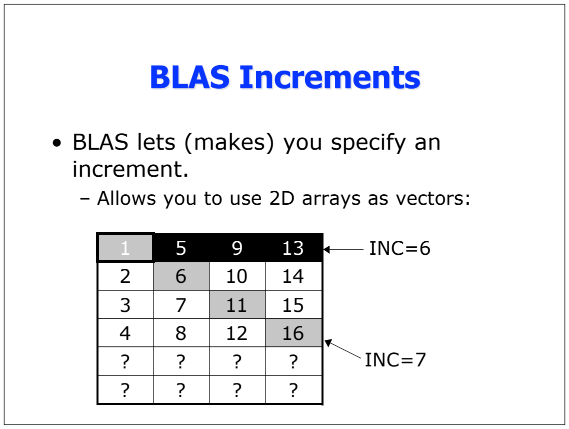
HW I Issues

- Some problems:
  - cc -lm csin.c -ocsin
    - -lm tells compiler to find a library called "libm.a," and get any routines it needs
  - Searching LAPACK
    - much easier to go through LAPACK "Quick Search" than through GAMS



HW I Issues

- Calling BLAS
  - Look on BLAS sheet for routines that do y<-Ax
    - nothing matches, but find several routines that solve y<-αAx+βy
  - CALL SGEMV('n',m,n,1.0,C,NMAX,v,1, 0.0, PC, 1)
    - As a matrix, C is m-by-n, but as an array, it is NMAX-by-KMAX
    - BLAS needs both: NMAX (LDA) lets BLAS know where columns start
    - Also, α & β should be real (1.0 and 0.0, 1 and 0 won't work on some systems)



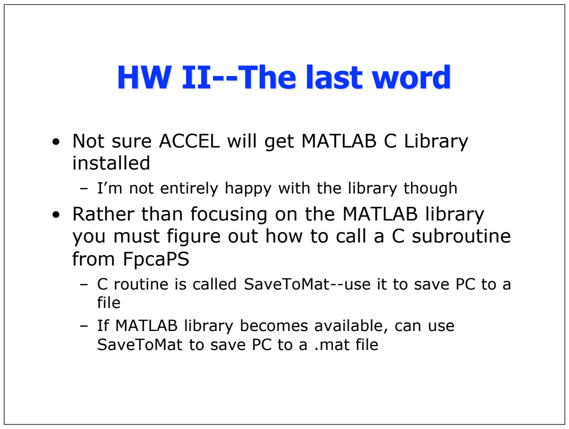
BLAS Increments

- BLAS lets (makes) you specify an increment.
  - Allows you to use 2D arrays as vectors:

1	5	9	13
2	6	10	14
3	7	11	15
4	8	12	16
?	?	?	?
?	?	?	?

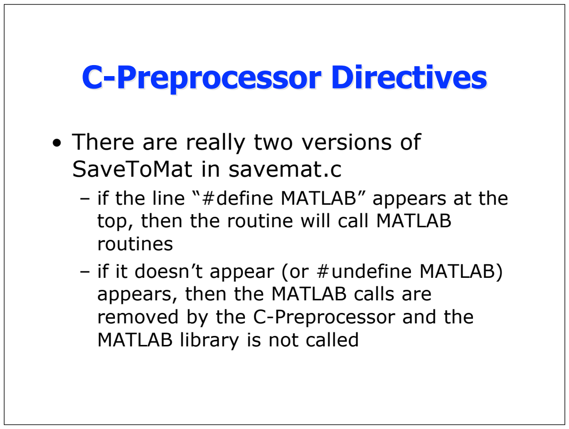
INC=6

INC=7



HW II--The last word

- Not sure ACCEL will get MATLAB C Library installed
  - I'm not entirely happy with the library though
- Rather than focusing on the MATLAB library you must figure out how to call a C subroutine from FpcaPS
  - C routine is called SaveToMat--use it to save PC to a file
  - If MATLAB library becomes available, can use SaveToMat to save PC to a .mat file



C-Preprocessor Directives

- There are really two versions of SaveToMat in savemat.c
  - if the line "#define MATLAB" appears at the top, then the routine will call MATLAB routines
  - if it doesn't appear (or #undefine MATLAB) appears, then the MATLAB calls are removed by the C-Preprocessor and the MATLAB library is not called

Disclaimer

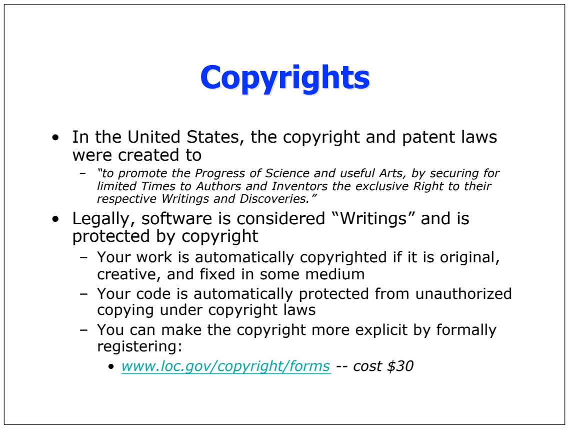
- The legal information presented below is for entertainment (and edification) only. No one should be trusted on legal matters, except a lawyer. Even then, I'd be careful.
- Use of this information in a manner inconsistent with the product label is a violation of Federal law
- Side effects may include, headaches, nausea, severe boredom, loss of appetite

A Free Lunch?

- Lots of free code available from NETLIB, GAMS, and WWW
  - Why doesn't NETLIB charge a fee?
  - Is it really free?

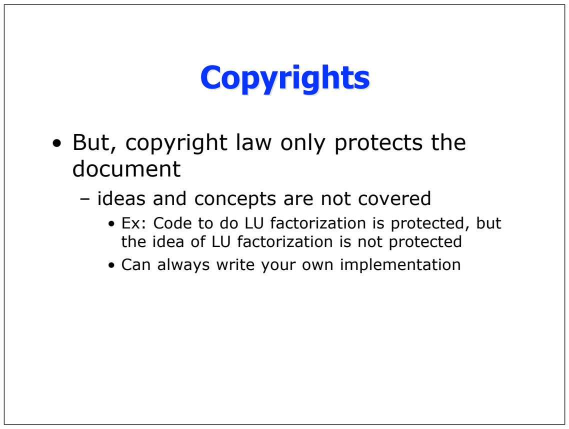
Software Licensing Spectrum

- Can classify software (source code) based on
  - limitations on viewing
  - limitations on use
  - limitations on distribution
- No license------>GPL------>Proprietary
- Unprotected---->Copyrighted---->Patented---->Secret



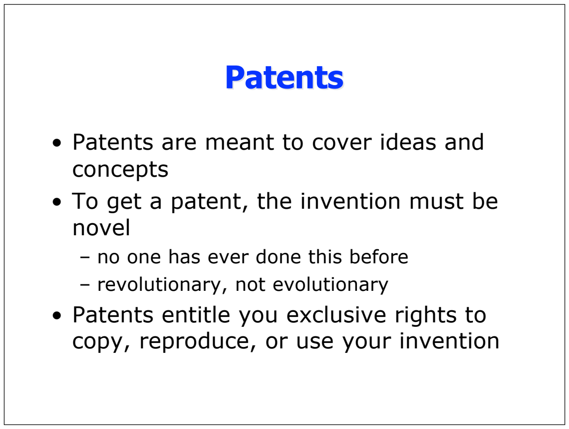
Copyrights

- In the United States, the copyright and patent laws were created to
  - *"to promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries."*
- Legally, software is considered "Writings" and is protected by copyright
  - Your work is automatically copyrighted if it is original, creative, and fixed in some medium
  - Your code is automatically protected from unauthorized copying under copyright laws
  - You can make the copyright more explicit by formally registering:
    - *www.loc.gov/copyright/forms -- cost $30*



Copyrights

- But, copyright law only protects the document
  - ideas and concepts are not covered
    - Ex: Code to do LU factorization is protected, but the idea of LU factorization is not protected
    - Can always write your own implementation



Patents

- Patents are meant to cover ideas and concepts
- To get a patent, the invention must be novel
  - no one has ever done this before
  - revolutionary, not evolutionary
- Patents entitle you exclusive rights to copy, reproduce, or use your invention

Patents

- But, getting a patent
  - takes a long time
  - cost money (legal and registration fees)
- And may not be possible, at least for you.
- Grad students, post-docs, faculty signed patent rights to Cornell
  - Applies to patents developed during official work
  - Still free to tinker in your garage
- Undergrads are unrestricted

Relevance to Science

- Our scientific careers depend on how others view our work
  - We want people to see and use our code
  - Practically, we hope this will increase our stature (more citations)
  - Ethically, science has always relied on an open exchange of ideas
    - Being too protective of our code goes against this

Relevance to Science

- We want people to use our stuff, but
  - we don’t want them making money without giving us a piece of the action
  - we don’t want to be liable if somebody does something stupid (including us)
- A software license allows you to let people see/copy your work, subject to the conditions you specify
  - An explicit exception to copyrights

GNU General Public License

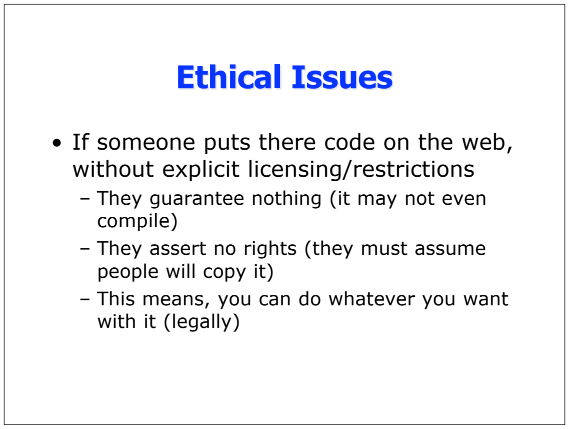
- The software “club” GNU has developed a “General Public License” (GPL)
- The GPL allows someone to see/use/modify your code, IF
  - they document changes they made (so they reflect on their reputation, not yours)
  - they distribute any program derived from your work under the same license (so they can’t steal your work)
  - they agree not to sue you if they (or your program) do something stupid

GNU General Public License

- Under the GPL,
  - You can charge people to download your program
    - but, they can demand everything, including source code and can modify it
    - This keeps the software “free”

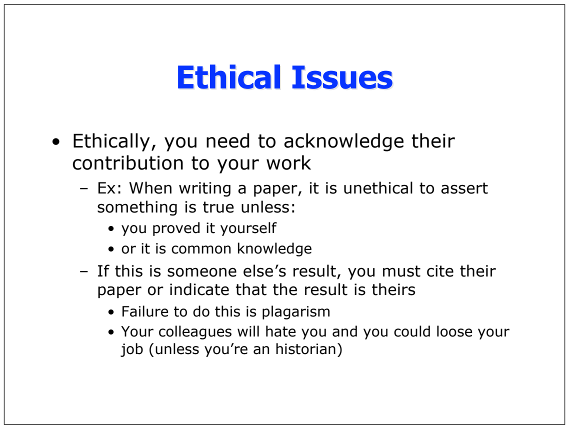
GNU General Public License

- To apply GPL to your work, include the official statement in a license or README file or comments in the source
- The official statement says things like
  - *This program is free software; you can redistribute it and/or modify it under the terms of the GNU General Public License*
  - *This program is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.*
  - See http://www.gnu.org/copyleft/gpl.html for more info



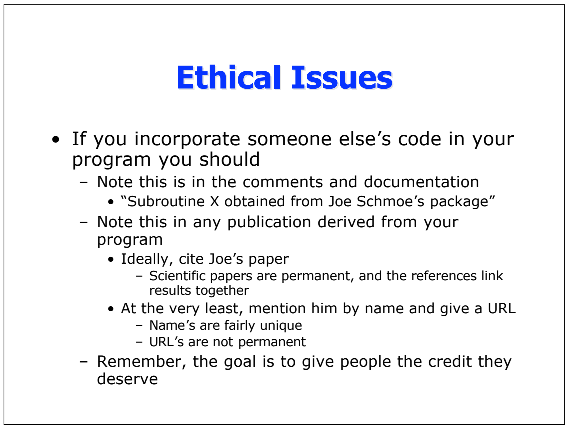
Ethical Issues

- If someone puts there code on the web, without explicit licensing/restrictions
  - They guarantee nothing (it may not even compile)
  - They assert no rights (they must assume people will copy it)
  - This means, you can do whatever you want with it (legally)



Ethical Issues

- Ethically, you need to acknowledge their contribution to your work
  - Ex: When writing a paper, it is unethical to assert something is true unless:
    - you proved it yourself
    - or it is common knowledge
  - If this is someone else's result, you must cite their paper or indicate that the result is theirs
    - Failure to do this is plagarism
    - Your colleagues will hate you and you could loose your job (unless you're an historian)



Ethical Issues

- If you incorporate someone else's code in your program you should
  - Note this is in the comments and documentation
    - "Subroutine X obtained from Joe Schmoe's package"
  - Note this in any publication derived from your program
    - Ideally, cite Joe's paper
      - Scientific papers are permanent, and the references link results together
    - At the very least, mention him by name and give a URL
      - Name's are fairly unique
      - URL's are not permanent
  - Remember, the goal is to give people the credit they deserve