MAT 305:
Mathematical
Computing

John Perry

What this class
is about

Computer
programming

Words I
shouldn't have
to say

Summary

MAT 305: Mathematical Computing
Introduction to Mathematical Computing

John Perry

University of Southern Mississippi

Spring 2017

Outline

1 What this class is about

2 Computer programming

3 Words I shouldn't have to say

4 Summary

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Description

Introduction to symbolic mathematical problem solving using computer based systems.

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Description

Introduction to symbolic mathematical problem solving using computer based systems.

- *introduction:* there is a huge world beyond this
- *symbolic:* as opposed to *numeric*
  - exact v. approximate

Problem solving or programming?

- This class is about mathematics

  - Problem solving
  - Introduce ideas of higher mathematics: matrix properties, modular arithmetic

- Some problems best attacked with a computer

  - Long
  - Experimentation
  - Repetitive/tedious

- Computers require instructions, called **programs**

- We study *some* programming, *but* this is not a programming class

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Why program?

- Control over computer
- Deeper understanding of computer technology

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Why program?

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- Computers don't understand human languages
  - Humans intuitive, poetic; computers literal, mechanical
  - Computers only understand **on** or **off** ("machine code")

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- (Most) humans don't understand a computer's native language
    - Mathematics literal and precise, but (most) humans don't understand it, either!
    - Even the humans that do, prefer not to talk to the computer in that language

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Kinds of computer languages

- Interpreted
  - BASIC, Python, Perl
  - computer reads source, repeats following:
    - translate symbols until full command formed
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  - no translation saved

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- Mixed ("bytecode")
    - C#(.NET), Java
    - reads source, translate into **byte**code, saves
    - translation works in "virtual machine" (JVM, .Net, …)

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Yes, this is a "Dr. Perry" class

Student comments, Fall 2016:

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If a student went to his office hours for
help, he would often tell students to look
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(guess which one was written by a math major)

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- read the text
- do the assigned work
- don't cheat
- ask questions... but not "dumb" questions

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- Any question I've answered 8,587,245 times already
  - turn off phone, log off Facebook
  - **pay attention**

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- A question you could answer yourself in 5 seconds

What is not a dumb question?

Most questions!

- "Can you make the screen text bigger?"
- "Can you go back to the previous slide?"
- "Can I get a hint on this problem?"
- "What you typed isn't working for me. Can you check what I have?"
- "What does this error mean?"
- "Why isn't my program working?"
- "Will you be in your office today?"
- "What's your website again?"

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- "I don't understand."
- "This is complicated."
- "My program isn't working."
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Common misconceptions

- "I can't do this."
- "I'll never learn."
- "Programming's not for me."

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Has cheating been a problem?

Yes

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- every one of the last 5 years, probably more
- at least one Honors student involved
- at least one degree denied
- half of a 2016 class was dishonest in one way or another

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You have been warned.
(You are graduate students, so this won't be a problem... *right?*)

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"What, me cheat?"

Definitely cheating:

- using someone else's solution to the same problem
- pretty much any online search
  - looking up a solution to a similar problem online
  - adapting an online solution to a similar problem
  - **do not use online help sites**

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Definitely *not* cheating:

- asking the professor for help
    - I will help you, though it may not be fun
- reading the book
    - adapting a book/class program to a similar problem
- discussing program design/implementaiton with others
    - just don't *copy* or have them tell you what to type

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- Class on *mathematical* problem solving with *computers*

- Some programming involved, but that is not the purpose

- Uses programming via Sage