And I feel fine!

Engin 101

It’s the end of the class as we know it.

Today

• Quick overview of what you’ve learned.
• Lessons learned (non-programming)
• Final Exam review

Official description of 101

• Algorithms and programming in C++ and MATLAB, computing as a tool in engineering, introduction to the organization of digital computers.

What you’ve learned: Programming

Programming basics
– Variables, selection (if/else), loops
• Basic data structures
– Arrays, structs
• Functions
– Arguments/Parameters, return values, scope
• OOP
– Classes, function members, constructors, etc.
• Seen much of the above in C++ and Matlab.
What you’ve learned:
Misc.

• Important structures/algorithms
  – Stack
  – Sorting
• Computer operation
  – Number representation
  – Character representation (ASCII)
  – Idea of assembly code
• Matlab
  – Graphing
  – Advantages/Disadvantages vs C++

High-level goals

• Learn to formally design a solution to a problem
  – Understand the problem.
  – Break the problem into parts, solve each part in turn.
    • Useful in all engineering domains
    • Something you will probably not be a master of for years and years.
  – Practice with finding errors in your design
    • Programming gives fairly quick feedback about a flawed design.

High-level goals

• Learn to not be afraid of computers
  – Gain some insight into how they work
  – Gain some confidence with something other than just using applications.
    • Many of your “tools of the trade” (CAD systems, etc.) will have some degree of programmability.
      You need to be comfortable with that.
  – Know you can program, even if you aren’t (yet) great at it
    • Even if you don’t want to.

High-level goals

• Understand issues related to programming
  – When hiring someone to do a programming job.
    • Have an idea about what needs to be specified.
    • Have a feeling about the difficulty.
  – Understand what is “too hard or time consuming” for you to do yourself.
Reflection

- I want you to try to remember what you knew about programming before you walked in the door.

  It was a lot of work, but you also learned a lot.

  (I hope)

The final

- Not a huge amount to say.
  - Same format as previous exams
  - Covers whole class
  - Will be 30% or so Matlab.
    - May have a question you can answer in C++ or Matlab.
    - May have one you have to do in both!
  - Previous exams haven’t been able to cover everything.
    - Be aware that the assembly programming or related things might appear.

Practice: “Simple” programming

- Write a C++ function
  - `int longsum(int start, int end);`
- It is to return a number the sum of integers from start to end *including end but not start*. So `sum(3,5)` should return 9 (4+5).

Practice: Matlab

- Write a Matlab function named “list1”
  - It is to take a 2D array as an argument.
  - It is to return the largest value in column 1 minus the smallest value in the whole array.
  - You may not use a loop.
    - (Recall matlab lists things as (row,column).)
Practice: Misc

- Write -4 as a 5-bit 2’s complement number.
- Is A || !B the same as !A & & B?
  - How about !(A & & B)
- What is the difference between a struct and a class in C++?
- When can you use a loop without {}?
- Define the term “gap” as it relates to floating point numbers.

Style and errors

Consider this (poor/wrong) code

```cpp
const int MAXC=10;
int sum=0;
int list[MAXC];

for(i=0;i<MAXC;i++)
    sum+=i;
    list[i]=sum;
cout << sum;
```

Things to know

- I’ll post inlab answers by the end of today.
- I’ll post a matlab sheet of functions you need to know by the end of today.
- Office hours are normal today and Tuesday.
- Last time to turn in practical 2 is noon Wednesday.
- Reviews sessions times/places on the website.
- Check grades on the grade database.
- Exam rooms will be posted by Tuesday night.