

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

```
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.