How much programming will be required for your project?
Uh, about 1000 lines of code.

How fast can you type?
About 30 words per minute.

Unreasonable math.

Great, I expect a working version by this afternoon.
Can you use non-imaginary math?
Revisit Anatomy

int check_length (string input);

int check_length(string input) {
    int len = 0;
    while (input[len] != '\0') {
        len++;
    }
    return len;
}

int res_length = check_length("hello world");

Answers:
1. Declaration
   - Return Type, name, parameter listing
2. Definition
   - Function header
   - Function body
3. Function call
   - name, arguments
Exercise: Binary Conversion

• Recall from recitation one how to convert a binary number to a decimal

\[ \sum \text{for each bit} \] 2^\text{location} \times \text{val at location} 

\[ 2^7 \quad 2^6 \quad 2^5 \quad 2^4 \quad 2^3 \quad 2^2 \quad 2^1 \quad 2^0 \]
How would we write a program to convert binary to decimal?

• How are you going to take input?
• What should be the output?
• What errors may occur?

String of 0 and 1
Integer

Not zero or one

Ex: "hello world" "101.1"
nothing
"8"
"8.1"

Overflow

Signed or Unsigned
What functions do we need?

- check valid binary number string with only 0's and 1's
- length(), pow()
- binary converter
- main
- get_bin() → if valid
  → return
  → otherwise loop
Design your functions

• Each function should have
  • Name
  • Return type
  • Parameter listing

• What are the preconditions for each one? Do they need the results of other functions?
```cpp
#include <iostream>
#include <cmath>
#include <string>

using namespace std;

bool check_bin(string bin) {
    if (bin.length() == 0) {
        return false;
    }
    for (int i=0; i < bin.length(); i++) {
        if (bin[i] != '0' && bin[i] != '1') {
            return false;
        }
    }
    return true;
}

string get_bin() {
    string bin = "";
    do {
        cout << "Please give an unsigned binary number: ";
        getline(cin, bin);
    } while (check_bin(bin) == false);
```
```cpp
string get_bin() {
    string bin = "";
    do {
        cout << "Please give an unsigned binary number: ";
        getline(cin, bin);
    } while (check_bin(bin) == false);
    return bin;
}

int main () {
    cout << "Test check_bin" << endl;
    cout << "Input: \"0110\", Expected Output: true, Actual Output: " << endl;
    if(check_bin("0110")) {
        cout << " True, PASS" << endl;
    } else{
        cout << "False, FAILS" << endl;
    }
    return 0;
}
```