CS 161
Intro to CS I
Beginning to Program
Odds and Ends

• Assignment #1 due Sunday.
• Don’t forget to sign up for a demo.
• Finish reading about variables and expressions.
• Begin reading about conditional execution, i.e. if/else blocks.

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Precedence

• What is precedence?
  – Binding power of operator
  – \((\ast, /, \%\) vs. \((+, -)\)

• How do we override precedence?
  – Parenthesis!

• Examples:
  
  \[
  12 \ast 4 + 6 \ast 10 \text{ vs. } ((12 \ast 4) + 6) \ast 10
  \]
Arithmetic

• Integer Arithmetic
  std::cout << 3/8; /*prints 0*/
  std::cout << 34/5; /*prints 6*/

• Floating Point Arithmetic
  std::cout << 34.0/5.0; /*prints 6.8*/
  std::cout << 3.0/8; /*prints .375*/
  std::cout << 3/8.0; /*prints .375*/
Type Casting

• Casting
  
  ```cpp
  std::cout << 34 / (int) 5.0; /*prints 6*/
  std::cout << (int) (34 / 5.0); /*prints 6*/
  std::cout << (float) 34 / 5; /*prints 6.8*/
  ```

• What is wrong with these?
  
  ```cpp
  std::cout << (int) 34 / 5.0; /*prints 6.8*/
  std::cout << (float) (34/5); /*prints 6.0*/
  ```
How do we read into a variable in C++?

• Declare a variable
• Read value from user and store at variable location
• How do we do this?

```cpp
#include <iostream>

int main() {
    int x;
    std::cin >> x;
    std::cout << x;
    return 0;
}
```
```cpp
#include <iostream>
#include <limits.h>  //climits
#include <cmath>    //math.h

using namespace std;

int main() {
    unsigned int x=UINT_MAX;  //unsigned max can fit in unsigned variable
    int num_bits;
    int result=0;  //need to start the result with zero, otherwise garbage
    int bin_num;

    cout << x << endl;  //print value in x
    cout << "library int max: " << INT_MAX << endl;

    cout << "Give me num bits: ";
    cin >> num_bits;

    //typecast pow because it gives a floating point num back
    //calculate largest signed, which can be max 64 bits
    cout << (long) pow(2,num_bits-1) - 1 << endl;

    //calculate largest unsigned, which can be max 64 bits
    cout << (unsigned long) pow(2,num_bits)-1 << endl;

    return 0;
}
```
Get into groups of 4-5

- How are you converting a 4 bit binary number to decimal number using no strings, conditionals, repetition, or built-in functions?
```cpp
#include <iostream>
#include <limits.h> //climits
#include <cmath>    //math.h

using namespace std;

int main() {
    unsigned int x=UINT_MAX;  //unsigned max can fit in unsigned variable
    int num_bits;
    int result=0;            //need to start the result with zero, otherwise garbage
    int bin_num;

    cout << x << endl;   //print value in x
    cout << "library int max: " << INT_MAX << endl;

    cout << "Give me num bits: ";
    cin >> num_bits;
    //typecast pow because it gives a floating point num back
    //calculate largest signed, which can be max 64 bits
    cout << (long) pow(2,num_bits-1) - 1 << endl;
    //calculate largest unsigned, which can be max 64 bits
    cout << (unsigned long) pow(2,num_bits) - 1 << endl;

    result = result + bin_num%10*1; //get the value in 1s place to calc result
    bin_num=bin_num/10;        //since you processed the digit, get rid of last digit
    return 0;
}
```