CS 161
Intro to CS I

Finish Variables, Constants, Expressions, and User Input
Chap. 2/3
Odds and Ends

• Please make sure you have a way to get information onto/off the ENGR server.
  – Map a network drive
  – Transfer files: Filezilla

• Assignments must compile and run on ENGR!

• Demos start next week (no laptop required).

• Sign-up for demo on home page, after you submit your assignment.
Variables

• What is a variable?
  – Memory location with name and type to store value

• What is a declaration?
  – Statement requesting variable w/ name and type
  – Examples:
    double height;
    int age;
Variables/Identifiers

• Identifier: name given to item in program
  – Ex. Variables and Functions
  – Start with letter
    • Letters include: upper-case, lower-case, underscore (_)
  – Followed by sequence of letters and digits
  – Good examples: hiThere, two_plus_two, _hello
  – Bad examples: 5dogs, hi-there, hello there
• Can’t Use Keywords, refer to book...
Variables

• How do we get a value in the variable?
  – Assignment Statement
    int age;
    age = 20;
    Or
    int age = 20;
  – = IS NOT equal to!!!!!
  • “gets” or “is assigned”
Printing Variables

• C++: cout
  – Example:
    ```cpp
    std::cout << "The integer value is: " << value;
    ```
  – What about the newline?
Constants

• What is a constant?
• How do we define a constant?
  – Use of a macro
    • #define
    • Placed at top of program
    • No semicolon at end
    • Example: #define MAX_SIZE 100
  – Use of const
    • Same as declaring variable but const
    • Example: const int MAX_SIZE = 100;
Intro to Macros

• C++: <climits>
• Use MIN and MAX macros from library
  http://www.cplusplus.com/reference/clibrary/climits/
  (Note that the values listed are not the values on our system!!!)
  – INT_MAX
  – INT_MIN
  – LONG_MAX
  – LONG_MIN
  – SHRT_MAX
  – SHRT_MIN
• Remember unsigned too…
Expressions

• What is an expression?
  – Set of operations producing a value
    • Combining simple values
      12 * 4 + 6 * 10 vs. ((12 * 4) + 6) * 10
Expressions cont.

• Pieces of an Expression:
  – Operators
    • Indicate operation, e.g. +, *, /, -, %
  – Operands
    • Values in the expression
  – Evaluation
    • Process of obtaining results from operations on operands
Arithmetic Operators

- Add
  \[ 34 + 23 \]
- Subtract
  \[ 34 - 23 \]
- Multiply
  \[ 2 \times 23 \]
- Divide
  \[ 40 \div 10 \]
- Remainder/Mod
  \[ 34 \% 5 \]

\[ 4 \]

\[ 10 \div 40 \]

\[ 0 \]
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
  
  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?
  
  std::cout << (int) 34 / 5.0; /*prints 6.8*/
  std::cout << (float) (34/5); /*prints 6.0*/
Precedence

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

• How do we override precedence?
  – Parenthesis!

• Examples:
  \[
  12 * 4 + 6 * 10 \text{ vs. } ((12 * 4) + 6) * 10
  \]
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?
  
  ```
  #include <iostream>
  int main() {
    int x;
    std::cin >> x;
    std::cout << x;
    return 0;
  }
  ```
```cpp
#include <iostream>
#include <climits>

using namespace std;

int main() {
    int num, num1;
    cout << "hello class!" << endl;

    cout << INT_MAX << endl;
    cout << INT_MAX+1 << endl;  // notice this gives warning

    num=INT_MAX;  // notice this doesn't give warning
    num=num+1;  // notice this doesn't give warning
    cout << num << endl;

    cout << hex << INT_MAX << endl;
    cout << dec << INT_MIN << endl;  // got to go back to dec

    // variable stuff
    cout << "enter num 0-15: ";  // give prompt for reading input
    cin >> num;

    cout << num/8;  // integer arithmetic, 0 or 1 if there aren't/are 8s
    num=num-(num/8)*8;  // now don't take or take those 8s out of num

    return 0;
}
```
Reading and Assignments...

• Finish Reading Chap. 3
• Exercise due Today!!!
• Assignment Due on Sunday!!!