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:
    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/](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...
Demo...
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 * 23
- Divide
  40 / 10
- Remainder/Mod
  34 % 5
Arithmetic

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

• Floating Point Arithmetic
  ```cpp
  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 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?

```cpp
#include <iostream>

int main() {
    int x;
    std::cin >> x;
    std::cout << x;
    return 0;
}
```
Demo...
Reading and Assignments...

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