CS 161
Intro to CS I

Expressions and User Input
Chap. 1.2 - 1.5
Quiz #1

• Get into groups of 3-4
• Discuss Assignment #1.
• Design an algorithm for the solution:
  – What will the variable declarations and assignments look like?
  – How are you going to directly compute the largest and smallest signed short numbers? (Assume a short is 2 bytes.)
Program Demo

```cpp
#include <iostream>
#include <climits>

using std::cout;
using std::endl;

int main(void) {
    unsigned short us_num;
    us_num = USHRT_MAX;
    cout << us_num << endl;
    return 0;
}
```
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
  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 vs. ((12 * 4) + 6) * 10
int main() {
    //declare variables
    double height;
    double weight;
    double bmi;

    //compute BMI
    height = 70.0;
    weight = 195.0;
    bmi = weight / (height*height) * 703;

    //print results
    std::cout << “Current BMI: ” << bmi << std::endl;

    return 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;
}
```
Reading/Assignments

• Read Chap. 2.1