CS 161
Intro to CS I

More Programming and Conditional Statements
Odds and Ends...

• Recitation Quiz #1 due today by 11:59pm
  – Email to specific recitation TA
• Assignment #1 due Sunday by 11:59pm
  – Submit on TEACH
  – If off campus, need VPN for mapped network drive
  – It must compile and run on ENGR!!!
• Make demo appointment (signup homepage)
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...
Demo...
Expressions

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

    • Combining variables
      var1 * var2 + var3 * var4 vs. ((var1 * var2) + var3) * var4
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
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
Arithmetic

- Integer Arithmetic
  ```cpp
  std::cout << 3/8;  /*prints 0*/
  std::cout << 34/5;  /*prints 6*/
  int age=5;
  std::cout << age/2;  /*prints 2*/
  ```

- Floating Point Arithmetic
  ```cpp
  std::cout << 34.0/5.0;  /*prints 6.8*/
  std::cout << 3.0/8;  /*prints .375*/
  float years=2.0;
  std::cout << age/years;  /*prints 2.5*/
  ```
Type Casting

• Casting
  std::cout << age / (int) years; /*prints 2*/
  std::cout << (int) (age / years); /*prints 2*/
  std::cout << (float) age / 2; /*prints 2.5*/

• What is wrong with these?
  std::cout << (int) age / years; /*prints 2.5*/
  std::cout << (float) (age/2); /*prints 2.0*/
Demo...
Additional Operators

• Common operation: fetch/store same variable
  var = var + 2;  //increment variable contents
  var = var * 2;  //double variable contents
  – Assignment/operator combination (all ops supported):
    var += 2;
    var *= 2;

• Pre/Post increment/decrement: ++ and –
  – Example: age++ vs. ++age
Demo...
Decisions in Life

• What is a decision?
• When do we make decisions?
• How do we make decisions?

If it is sunny today
    then I’ll go to the beach and fly a kite
Else if it is raining today
    then I’ll stay inside and read a book
Else if it is snowing
    then I’ll go to the mountains to ski
Decisions within Decisions

• What happens if there is no wind at the beach?

• How does this change our decisions?
  If it is sunny today
    then I’ll go to the beach
  if it is windy at the beach
    then I’ll fly a kite
  if it is not windy at the beach
    then I’ll walk on the shore
Flow chart for decisions

- Is it sunny?
  - Yes: Go to beach
  - No: Is it raining?
    - Yes: Read book
    - No: Go outside

- Is it windy?
  - Yes: Fly kite
  - No: Walk on beach