CS 161
Intro to CS I
Conditional Statements
Odds and Ends

- Assignment #2 posted
- Get Assignment #1 demoed
- Read about conditionals (if/else statements)
#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;
}
New Operators for Expressions

• What if you have the statement `var = var + 1;`  
  `var += 1; /*Add operand on right to var*/`
  `var++;  /*Increment var by one*/`

• What if you have the statement `var = var - 5;`  
  OR `var = var + var;`

  `var -= 5;`
  `var += var;`

• Pre vs. Post increment: `++var` vs. `var++`
Demo...
Conditionals

- [https://code.org/educate/resources/videos](https://code.org/educate/resources/videos)
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

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

2. Is it windy?
   - Yes: Fly kite
   - No: Walk on beach
Decisions in our programs

• Use an if/else

  if (<expression>) {
    <statement>;
    ...
    <statement>;
  }
  else {
    <statement>;
    ...
  }
What is the <expression>?

Could be a relational expression:

<expression> <relational op> <expression>

- Relational Ops
  - == - equal to
  - != - not equal to
  - < - less than
  - > - greater than
  - <= - less than or equal to
  - >= - greater than or equal to
Examples

- if(2 + 1)  //expression
- if(2 − 4)  //expression
- if(2 − 2)  //expression
- if(4 == 4)  //expression relational op expression
- if((2+1) == 4)  //expression relational op expression
- if(4.1 != 4)  //expression relational op expression
- if(3 <= 4)  //...
- if(4 >= 4)
- if(3.5 > 4)
- if(4 < 4)
- if(3+2*2 > 9)
- if((3+2)*2 > 9)
Logical Operators

• AND: if((1>2) && (2<5))
• OR: if((1>2) || (2<5))
• NOT: if(!(1>2) && (2<5))

• Precedence of Operators: refer to book
C++ If/Else Syntax...

if( x > y) {
    cout << “X is greater than Y” << endl;
}

else {
    cout << “X is less than Y” << endl;
}

• When does this logic fail?
C++ If/Else...

```cpp
if( x > y) {
    cout << “X is greater than Y” << endl;
}
else if( x < y) {
    cout << “X is less than Y” << endl;
}
else {
    cout << “X is equal to Y” << endl;
}
```
What are the curly braces for?

if( x > y)
    cout << “X is greater than Y” << endl;
else if( x < y)
    cout << “X is less than Y” << endl;
else
    cout << “X is equal to Y” << endl;
What if we are testing for ==?

if( x == 0) {
    cout << “X is zero” << endl;
}
else if( x == 1) {
    cout << “X is one” << endl;
}
else if( x == 2) {
    cout << “X is two” << endl;
}
else {
    cout << “Not 0, 1, 2!!!” << endl;
}
Demo...
Assignment #2

• Let’s go over this.
• What decisions are you going to make?