CS 161
Intro to CS I
Looping/Repetition
Odds and Ends...

• Read loops/repetition
• Assignment #3 posted, due next Sunday 1/31
• Exercise #3 posted, due Friday 1/22
• Lab #3 make-up, KEC 1003 Friday, 1/22, 3-5pm
• Demo assignment #2, 1/19-1/25
Multiple Decisions

• What if I want to make these same decisions for the whole year?
  
  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
  else if it is not windy at the beach
  then I’ll walk on the shore

  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

• Repeat the process for 365 days
How do we do this?

- Repetition: for loops
  - Semantics
    - Repeat for a specific # of iterations w/ starting point, ending point, and an increment
  - Syntax

```java
for(x=1; x <= 365; x++) {
    <statement>;
    <statement>;
    ...
}
```
The for Loop

```java
for(x=1; x <= 365; x++) {
    <statement>;
    <statement>;
    ...
}
```

Starting point: Initialization
The for Loop

for(x=1; x <= 365; x++) {
    <statement>;
    <statement>;
    ...
}

Ending point: Continuation Test
The for Loop

```java
for (x=1; x <= 365; x++) {
    <statement>;
    <statement>;
    ...
}
```

• What do you notice about order?
The for Loop

```java
for(x=1; x <= 365; x++) {
    <statement>
    <statement>
    ...
}

• Same as x = x+1
• What about x = x + 2?
```

Increment: Update

- Condition checks when the loop runs.
- Increment updates the counter.

Happens when the condition is true.
The for Loop

```
int x;
for(x=1; x <= 365; x++) {
    <statement>;
    <statement>;
    ...
}
```

• What do you notice about order?

Ending point: Continuation Test
The for Loop

for(x=1; x <= 365; x++) {
  <statement>;
  <statement>;
  ...
}

Test is False: Execution after loop
The while loop

\( \text{for}(x=1; \ x \leq 100; \ x++) \)
\( \text{cout} \ll \text{"hello world\n";} \)

\( \text{VS.} \)
\( \text{int} \ x=1; \)
\( \text{while}(x\leq100) \{ \)
\( \text{cout} \ll \text{"hello world\n";} \)
\( x++; \)
\( \} \)

- repeat zero or more times
- once only
- Anything you can do w/ while you can do w/ for versa

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Common Mistakes

What if we forget this?
1. Never enter
2. May run too few or too many

What if we forget this?

```
int x = 1;
while (x <= 100) {
    cout << "hello world\n";
    x++;
}
```

`garbage`
The do/while loop

```cpp
int x=1;
do {
    cout << "hello world\n";
    x++;}
while(x<=100);
```

• Difference b/w while and do/while?
Looping ...

• for loops
  – Repeat for specific number of times
  – Example?

• while loops
  – Repeat while a condition is being met
  – Example?

• do while loops
  – Always do once, and repeat while condition is met
  – Example?
```cpp
#include <iostream>
#include <cstdlib>
#include <ctime>

using namespace std;
#define GUESSES 3

int main() {
    int rnum, unum;

    srand(time(NULL));

    rnum = rand() % 11;  // in the range 0-10
    cout << rnum << endl;

    // give user 3 changes to guess rand number
    for(int x = 0; x < GUESSES; x++) {
        cout << "Enter a number 0-10: ";
        cin >> unum;
        if (unum > 10 || unum < 0) {
            cout << "You idiot! Enter 0-10! ";
            cin >> unum;
        }
        cout << unum << endl;
    }
    return 0;
}
```

#define GUESSES 3

int main() {
    int rnum, unum;
    bool error=true;

    //only do this once and once only
    srand(time(NULL));

    rnum = rand() % 11; //in the range 0-10
    cout << rnum << endl;

    //give user 3 changes to guess random number
    for(int x=0; x<GUESSES; x++){
        error=true; //we assume they are an idiot first
        cout << "Enter a number 0-10: ";
        cin >> unum;
        do {
            if(unum>10 || unum<0){
                cout << "you idiot! enter 0-10! ";
                cin >> unum;
            }
            else
                error=false;
        }while(error==true);
        cout << unum << endl;
    }
    return 0;
}