CS 161
Intro to CS I

Finish Loops (Chap. 2.3)
Errors and Debugging
The do/while loop

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

• Difference b/w while and do/while?
The comma

- Separator – Ex. double x, y;
- Operator – Ex. x=(34, 4, 56+4);
- Very few practical uses!!
- Just because you can doesn’t mean you should!
```cpp
#include <iostream>
#include <sys/time.h>
#include <cstdlib>

int main() {
    int i, j, k, l;
    struct timeval stop, start;

    // Time with a comma operator
    gettimeofday(&start, NULL);
    for(i=0, j=0; i<10000000;i++,j++) {}
    gettimeofday(&stop, NULL);
    if(stop.tv_sec > start.tv_sec)
        std::cout << "Seconds: " << stop.tv_sec-start.tv_sec << std::endl;
    else
        std::cout << "Microseconds: " << stop.tv_usec-start.tv_usec << std::endl;

    // Time without a comma operator
    gettimeofday(&start, NULL);
    for(i=0, j=0;i<10000000;i++) {
        j++;
    }
    gettimeofday(&stop, NULL);
    if(stop.tv_sec > start.tv_sec)
```
Programming Errors

• Syntax errors
  – Misuse of C++ language
  – How are they caught?

• Logic errors
  – Doesn’t perform task correctly (aka. bugs)
  – How are they caught?

• Runtime errors
  – Stops your program from running
  – How are they caught?
Syntax Error Examples

• Missing main function
• Use of identifier not declared
• Misspelled Words
• Forget a Semicolon
• Forget Required Keyword
• Missing quote, curly brace, and parenthesis
• Use of single quotes instead of double
Logic Error Examples

• Poorly written programs
  – Add instead of subtract (incorrect operation)
  – Using last two digits for date
  – Same error message for different errors
  – Program that never ends
  – Add one to the largest integer (could be syntax)
Runtime Error Examples

• Open a file that doesn’t exist
• Segmentation fault
  – Infinite loop that eats memory
  – Divide by variable that is zero
Debugging Errors

• Syntax:
  – READ compiler errors (pay attention to line #)
  – Use google to search for error

• Logic/Runtime
  – Use std::cout to find where the code is breaking
    • Print variable values
    • Print indicator messages
Quiz #3

• Get into groups of 4-5.
• Discuss Assignment #2, design a solution, and provide your algorithm using pseudocode.
  • Where do you need a loop (or loops), and what kind of loop(s) are you going to use?
• What can we do to prevent these errors?
  – Overflow
  – Divide by zero