CS 161
Intro to CS I

Begin Functions
Odds and Ends...

• Assignment #3 design due Sunday!!!
• Exam I – Friday, 10/21

• Don’t miss Demo, and be patient waiting
• READ, READ, READ!!!!
• Ask TA pointed questions
• Just THINK! KISS😊
Decomposition

• Divide Problem (task) Into Subtasks
  – Procedural Decomposition
  – Examples: cooking, cleaning, etc.
• Incremental Programming
  – Iterative Enhancement (Stepwise Refinement)
• Examples: Replicating Code
Procedural Decomposition

• Functions
  – int main() {
  }
  – User defined
    void draw_box() {
  }

• Function Call
  – draw_box();
#include <iostream>
using std::cout;

int main() {
    cout << "+--------+\n";
    cout << "|       |\n";
    cout << "+--------+\n";
    cout << "|       |\n";
    cout << "+--------+\n";
    return 0;
}

void draw_box(); //Declare function

int main() {
    draw_box();  //Use function
    draw_box();
    return 0;
}

void draw_box() {  //Define function
    cout << "+--------+\n";
    cout << "|       |\n";
    cout << "+--------+\n";
}
Functions Calling Other Functions

```cpp
#include <iostream>

void draw_box();
void draw_top_bottom();
void draw_sides();
int main() {
    draw_box();
    return 0;
}

void draw_box() {
    draw_top_bottom();
    draw_sides();
    draw_top_bottom();
}

void draw_top_bottom() {
    std::cout << "+-------+\n";
}

void draw_sides() {
    std::cout << "|       |\n";
}
```


Generalization

• Does a function make a task more specific or more general?
  – Justification
  – Examples
Functions

• What is a function?
  – Block of code to perform action/subroutine

• When have we seen functions already?
  – Predefined

• What is the purpose?
  – Reduce
  – Reuse
  – Readability
Predefined Functions

- sqrt()
- pow()
- abs()
- rand()
- srand()

What is the difference b/w srand(), rand(), and pow()/abs()/sqrt()?
void Functions

- Doesn’t return a value
- Still has arguments/parameters

Get into groups of 4-5

- Write a `void check_positive_int ()`
  - What does the parameter look like?
  - What does the function call look like?
  - Is it more useful to return a value?
Programming Demo
Programming Demo
Scope (Visibility)

• Part of program in which a declaration is valid

• Local variable
  – Declared inside a function only accessible inside function

• Localizing variables
  – Declaring variable in innermost scope
Illegal access outside loops

```cpp
for(x = 0; x < 10; x++) {
    int y = 10;
    cout << "The value of x * y is: " << x*y << endl;
}
cout << "The value of y is: " << y << endl; /*y outside scope*/
```

• How do we fix this?
• What about if/else blocks?
Illegal access in functions

```c
int main () {
    int x=2, y=3;
    compute_sum();
    sum = x+y; //error: sum hasn’t been declared
    return 0;
}

void compute_sum() {
    int sum = x+y; //error: x and y outside scope
}
```
C++ Pass by Value

void swap(int, int);
int main() {
    int a=5, b=10;
    swap(a, b);
    cout << “a: ” << a << “b: ” << b;
}
void swap(int x, int y) {
    int temp = x;
    x = y;
    y = temp;
}

• What if we didn’t have temp?