Riddles

- At night they come without being fetched, and by day they are lost without being stolen.
- I fly, yet I have no wings. I cry, yet I have no eyes. Darkness follows me.
- After you take away the whole, some still remains?
- What kind of coat can only be put on when wet?
- What jumps when it walks and sits when it stands?

More File I/O
Predefined Functions
Programmer Defined Functions

Luke Sathrum – CSCI 20

Today's Class

- More File I/O Operations
- Predefined Functions
- Programmer Defined Functions

More File I/O Operations

Filenames

- Sometimes we want the user to tell us the file they want to use
- We have to do something special to make this work

```
string filename;
std::ifstream fin;
cout << "Enter file name\n";
cin >> filename;
fin.open(filename.c_str());
```

How to Get an Entire Line

- Need to use the **`getline()`** function
- Example

```
string line;
getline(fin, line);
```

- It reads the entire (or rest) of the current line
  - Up to the newline character
  - It discards the newline character
- You can specify a different delimiter via the third parameter

```
getline(fin, line, '?');
```

- Do NOT use **`getline`** and **`fin >>`** in the same program

Getting Single Characters

- **`fin.get(a_variable);`**

```
char next;
in_stream.get(next);
```

- **`next`** now has the value of the first character in the file

End of File

- We also have a way to tell us when we hit the end of a file
  - `.eof()`
  - This returns a Boolean value
- Useful when we want to loop through a file until the end

```
do {
     cout << next;
     in_stream.get(next);
} while (!in_stream.eof());
```

Sample Code

- Adding to our File I/O abilities
  - `more_file_io.cpp`

Predefined Functions

Predefined Functions

- C++ has predefined functions we can use
- These functions are NOT part of any class
- Some we have already used
  - `time()`
  - `rand()`
- We will look at `sqrt()`
  - Computes the square root of a number

sqrt()

- Starts with the number we want to get the square root of
  - This is its argument
    - Can be a constant, variable, or an expression
- Produces the square root and gives it to us
  - The return value
    - We can only have 1 return value

sqrt()

- Syntax

```
the_root = sqrt(9.0);
```

- Function call

```
sqrt(9.0)
```

  - Is an expression
  - Can use wherever you use an expression

```
bonus = sqrt(sales)/10;
```

Predefined Functions

- Includes
  - Most predefined functions need to be included in your program
  - **`sqrt()`** is in **`cmath`**
  - **`#include <cmath>`**

Some Predefined Functions

Name	Description	Types of Argument(s)	Type of Value Returned	Example	Return Value	Include
`sqrt`	Square Root	`double`	`double`	`sqrt(4.0)`	`2.0`	`cmath`
`pow`	Powers	`double`	`double`	`pow(2.0, 3.0)`	`8.0`	`cmath`
`abs`	Absolute value for `int`	`int`	`int`	`abs(-7)` `abs(7)`	`7` `7`	`cstdlib`
`fabs`	Absolute value for `double`	`double`	`double`	`fabs(-7.5)` `fabs(7.5)`	`7.5` `7.5`	`cmath`

More Predefined Functions

Name	Description	Types of Argument(s)	Type of Value Returned	Example	Return Value	Include
`ceil`	Round Up	`double`	`double`	`ceil(3.2)` `ceil(3.9)`	`4.0` `4.0`	`cmath`
`floor`	Round Down	`double`	`double`	`floor(3.2)` `floor(3.9)`	`3.0` `3.0`	`cmath`
`exit`	End Program	`int`	`void`	`exit(1)`	None	`cstdlib`
`rand`	Random Number	`none`	`int`	`rand()`	Value Varies	`cstdlib`
`srand`	Set Seed for rand	`unsigned int`	`void`	`srand(42)`	None	`cstdlib`

Predefined `void` Functions

- These perform an action but do not return a value
- Used as a statement, not as an expression
- Can contain arguments, but does not return anything
- Example
  - `exit(1);`

Sample Code

- Using Predefined Functions
  - `predefined.cpp`

Programmer Defined Functions

Programmer Defined Functions

- We can create functions outside of classes
- Remember
  - We have two types of functions
- Functions that return a value
- Functions that do not return a value
  - `void` functions

Defining Functions

- Can define in same file as **`main()`**
  - Do NOT define inside of **`main()`**
- Can also defined in a separate file
  - Do this if you want to use in multiple programs
  - Great for portability

Function Declaration (Prototype)

- We declare our function at the beginning of our file
- Example
  - `double TotalCost(int num_param, double price_param);`

Function Definition

- Code that does the work of the function
- Consists of
  - A function header
  - A function body

Function Header

- Much like the declaration
  - `double TotalCost(int num_param, double price_param)`
- Example

```
double TotalCost(int num_param, double price_param) {
        Function Body
}
```

Function Body

- Enclosed in **{ }**
- Much like the body of main
- Contains declarations and statements
- Can use the parameters in the body
- If we have a return type we finish the function body with a return statement
  - `return something;`

Functions

- The Function Declaration goes before (above) **`main()`**
- The function definition goes after (below) **`main()`**
- We can call functions inside of functions
  - Both predefined and programmer defined functions

Sample Code

- Programmer Defined Functions
  - `programmer_defined.cpp`