

PIC 10A 1C. Week 6b Exercises. TA: Eric Kim.

1. Be the Compiler

Determine the output of the following code snippets. Assume that all libraries are included, and we are using the standard namespace. If there is an error, explain the error.

	Output:
<pre>int N = 5; for (int i = 0; i < N; ++i) { cout << i * 2 << " "; }</pre>	
<pre>string s = "meow"; for (size_t i = 0; i < s.length(); ++i) { if ((i % 2) == 0) s[i] = 'a'; else s[i] = 'b'; i += 1; } cout << s;</pre>	
<pre>int i = 1; while ((i % 2) == 0) { i *= 3; } cout << i;</pre>	
<pre>int i = 1; do { i *= 3; } while ((i % 2) == 0); cout << i;</pre>	
<pre>string s = "raptor"; for (char& c : s) { if (c == 'a') c = 'e'; if (c == 'e') c = 'i'; } cout << s;</pre>	
<pre>string s = "captain"; for (char c : s) { if (c == 'a') c = 'o'; } cout << s;</pre>	

2. Apples and Oranges

Consider the following class interfaces:

```
class Apple {  
private:  
    int mya;  
public:  
    int myb;  
    Apple();  
    Apple(int a);  
    void foo(Apple a);  
};
```

```
class Orange {  
public:  
    int myc;  
    Orange(int c);  
    void garply(Apple a, Orange b);  
};
```

Consider the following code. Are there any issues?

```
Apple apple1(2);  
  
Orange orange1(3);  
  
Apple apple2(orange1.myc);  
  
Orange orange2(apple2.mya);  
  
garply(apple1, orange1);  
  
orange1.foo(apple1);  
  
orange1.garply(Apple(1), Orange(2));
```

3. const Practice

Identify any possible issues with the code:

```
int a = 1;  
const int b = 1;  
int& c = a;  
int& d = b;  
c = 0;  
const int& aa = a;  
const int& bb = b;  
aa = 4;  
bb = 4;
```

4. Robbers Robbing Robbers

Define a Robber class interface that satisfies the following code:

```
Robber rusty("Rusty");
Robber dan("Dan");
rusty.greet(dan);
dan.greet(rusty);
int item_to_steal = dan.lookat(rusty);
dan.steal(rusty, item_to_steal);
cout << rusty.yell();
```

```
class Robber {
// YOUR CODE HERE
```

```
};
```

5. Vowel Counter

Write a program that, given a user-inputted string, counts the number of vowels. Assume that the user only inputs text in lowercase. For instance, here is an example expected output:

```
Please enter a word: apple
The word "apple" has 2 vowels.
```

6. Loopy

Rewrite the following while loop as an equivalent do-while loop and for loop:

```
int i = 0; int n = 20; int acc = 0;
while (i < n) {
    acc = acc + (2*i);
    if (acc > 10) {
        break;
    }
    i += 1;
}
// As a do-while loop: INSERT CODE BELOW
```

```
// As a for loop: INSERT CODE BELOW
```

Part 2: Louis Reasoner suggests the following answers:

```
do {
    acc = acc + (2*i);
    i += 1;
} while ((i < n) && (acc <= 10));

for (int i = 0; i < n; i += 1) {
    acc = acc + (2*i);
    if (acc > 10)
        break;
}

for (int i = 0; (i < n) && (acc <= 10); i += 1) {
    acc = acc + (2*i);
}
```

Are these equivalent to the original while loop? If so, explain why. If not, describe why not.
Hint: consider the values of acc and i at the end of the original while loop.

7. Forward Back

Write a program that, given a user-inputted string, repeats the string in the following pattern:

Please enter a word: Apple

```
A
 p
  p
   l
    e
     l
      p
       p
        A
```

Hint: Recall the <iomanip> library, ie: setw(), setfill(). Though you can do it without iomanip!

8. Debugging

Louis Reasoner wants to write a program that, given a user-inputted string, outputs it in reverse order. He thinks to himself, "A-ha! I'll just write a for-loop that traverses the string in reverse order!". He writes the following:

```
int main() {
    cout << "Enter a word: ";
    string wd;    cin >> wd;
    for (size_t i = (wd.size()-1); i >= 0; --i) {
        cout << wd[i];
    }
    return 0;
}
```

When he runs the program, the program correctly outputs the string in reverse order, but then quickly crashes. The error message complains about a string index out of bounds error. What could be the problem? Can you fix the code?

9. Search and DestroyReplace*

Write code that, given three strings `sent`, `s1`, `s2`, performs the following:

Wherever `s1` is found within `sent`, replace `s1` with `s2`.

Assume that `s1`, `s2` are the **same** length. Examples:

<pre>string sent = "i am happy"; string s1 = "i"; string s2 = "u";</pre>	Output: "u am happy"
<pre>string sent = "apples to apples"; string s1 = "app"; string s2 = "boo";</pre>	"booples to booples"
<pre>string sent = "aaa"; string s1 = "a"; string s2 = "b";</pre>	"bbb"