CSI 32 Final Exam, Additional Questions
Answers

1. Suppose **x** and **y** are integer variables and we form the sum **x + y**. Next, suppose **a** and **b** are decimals numbers (and we are using the type double for them) and we form the sum **a + b**.
The two + operators here are clearly being used for different types.
This is an example of _____.
Choose from the following options:

(a) inheritance
(b) operator overloading
(c) operator nesting
(d) type inconsistency

2. Assume that **myArray** is a non-empty built-in array of *integers* (not the C++ style array when we include the header <array>). How can I find its size, i.e. the number of elements in it?
Put the one-line statement:

```
sizeof(myArray) / sizeof(myArray[0])
```

3. When deriving a class with public inheritance, public members of the class become _____ members of the derived/child class and protected members of the class become _____ members of the derived/child class.

Fill in the blanks.

public, protected

4. When working with classes and virtual functions, what is the keyword `final` used for?

- ✗ A base/parent-class virtual function that is declared `final` in its prototype cannot be overridden by any derived class.
- ✗ We can declare a class as `final` to prevent it from being used as a base/parent class.

5. Write a C++ statement what will output/display the address stored in the variable `myPtr` of type `int *`.

```
cout << reinterpret_cast<void*>(myPtr) << endl;
```
or
```
cout << myPtr << endl;
```

6. Consider the definition of the `class myClass` and the definition of the function `main`:

```
class myClass {

public:

      myClass(string n = "") : na{ n } { c++; }

      ~myClass() { c--; }

private:
      string na;
      static int c;

};


int myClass::c{ 0 };

int main() {

      myClass *a1 = new myClass{ "Mary" }, *a2 = new myClass{ "Alice" };
      myClass *a3 = new myClass{ "John" };

      cout << "stage 1" << endl;

      delete a2;
      delete a2;

      cout << "stage 2" << endl;

}
```

How does the value of *static class attribute* `c` change?
(state `c`'s values after stage 1, and after stage 2)

c is used to count the number of "alive" instances of `class myClass`.

- ✗ After the stage 1 the value of c will be 3 as three instances of `class myClass` were constructed
- ✗ After the stage 2 the value of c will be 1 as two instances of `class myClass`were deallocated.

7. Consider a vector **myV** filled with integer values. And the definition of the function **myFunction**:

```
bool myFunction(int n) {

      if (n % 3 == 0) { return true; }
      else { return false; }

}
```

(a) What does the following code do?

```
      int count = count_if(myV.begin(), myV.end(), myFunction);

      cout << count << endl;
```

the algorithm **count_if** will count how many elements from vector myV satisfy to the function myFunction, which returns true is the value is a multiple of 3, and false otherwise.
Therefore, the code above counts the number of values in myV that are multiples of 3 and displays them.

(b) What would be a value of `count` variable if the vector `myV` is filled with integers from 1 to 13?

the values that are divisible by 3 in this range are 3, 6, 9, and 12. Therefore the number 4 will be displayed.