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CS1124 Exam Two 2017 Fall

Note that I have omitted any #includes or "using namespace std;" statements in all questions, in order to save space and to save your time thinking about them. You may assume that all such statements that are needed are present. And you don't have to write them either!!!

Please, read all questions carefully!

Answering the short-answer questions, in particular, requires that you read and *understand* the programs shown.

If a question asks you to write a class or a function and shows you output, be sure your class / function generates that output, unless the spec states otherwise.

| Questions | Points | |
|-----------|--------|--|
| 1 | xtra | |
| 2-3 | 4 | |
| 4-11 | 5 | |
| 12 | 6 | |
| 13 | 46 | |

Answer questions 1–12 in the exam book. For multiple choice questions, **circle** the correct answer. There should be only one correct answer / question.

Answer questions 13 in your blue book.

Place your name and id on every page in this book <u>before</u> the end of the exam. You will <u>lose points</u> if you have not done so when we call "time to put your pens / pencils down." Sorry to be punitive, but some students seem to want to get that small advantage over their classmates.

2017 Fall CS2124 Exam Two Page 1 of 11

1. [Extra credit] Who created C?

- a) Gosling
- b) Hopper
- (c) Ritchie
- d) Stroustrup



- e) Thompson
- f) van Rosum
- g) Wall
- h) None of the above

2. Given:

int* data = new int[12];

Pick an expression that is equivalent to: &data[5]

- a) data*5
- d) *data+5

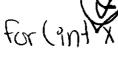


j) data+5

- b) & (data*5)
- e) *(data+5)
- h) (data+5)&
- k) data&+5

- (c) data+5
- f) (data+5)*
- i) &data+5
- 3. Using the <u>ranged for</u> (also known as the "foreach"), <u>modify</u> the vector of ints called intVec so that each entry becomes twice what it was. i.e. double each int in the vector.

 (No, you do not need to put this in a function.)



int/ec) {



}

4. Given: [Not the same question on exam one!]

void foo(int x) { \rightarrow const int* p = &x; // line A Cunnot Change // line B x = 17;address of // line C cout << *p << ' '; pointer // line D *p = 28: int main() { int y = 42; foo(y);cout << y << endl;</pre>

ehange whats

What is the result of compiling and running the above code? (Circle only one answer)

- a) The program will have a compilation error at line \boldsymbol{A}
- b) The program will have a compilation error at line B
- c) The program will have a compilation error at line C
- d) The program will have a compilation error at line D
 - e) The program will have a runtime error (or undefined behavior) at line D.

- f) The program will print out: 17 17
- The program will print out: 17 42
- h) The program will print out: 42 17
- i) The program will print out: 42 42
- j) The program will print out: 17 28
- k) The program will print out: 42 28
- l) All of the above
- m) None of the above.

int const *->> You can't change the contents constint *->> You can't change the contents and ** cosnt ->> You can't change the address

```
class Parent {
    public:
        virtual void foo() = 0;
    };

class Child: public Parent {
    public:
        void foo() { cout << "Parent\n"; } // Line A
    };

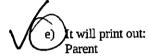
class GrandChild: public Child { };

int main() {
        GrandChild gc;
        gc.foo();
    }

// Line B
    // Line C
```

What will happen when we build and run the program?

- a) It will fail to compile at line A, because foo is not marked virtual
- b) It will fail to compile at line B because GrandChild is an abstract class.
- It will fail to compile at line C because foo is an abstract method.
- d) It will fail to compile for some other reason



- f) It will print out: Why? Wilky!
- g) It will compile, but will crash when run.
- h) None of the above

6. Given:

What is the result of compiling and running the above program?

a. , The program compiles and runs, printing "Pet::eat"

The program compiles and runs, printing "Cat::eat"

- The program compiles and runs to completion without printing anything.
- d. The program compiles and crashes when it runs.
- (e.) The program does not compile.
- f. None of the above.

7. What is the result of the following?

```
class Derived; // Yes, we need this.
🕽lass Base {
bublic:
    virtual void method(Base& arg) {
         cout << "Base::method(Base)\n";</pre>
    virtual void method(Derived& arg) {
         cout << "Base::method(Derived)\n";</pre>
    }
};
class Derived : public Base {
public:
    void method(Base& arg) {
         cout << "Derived::method(Base)\n";</pre>
    void method(Derived& arg) {
         cout << "Derived::method(Derived)\n";</pre>
    }
};
void someFunc(Base& arg) {
    arg.method(arg);
d.method(devold
int main() {

∠Derived d;
    someFunc(d);
}
```

- a. The program runs and prints: Base::method(Base)
- b. The program runs and prints: Base::method(Derived)
- The program runs and prints: Derived::method(Base)

The program runs and prints: Derived::method(Derived)

- e. The program fails to compile
- f. A runtime error (or undefined behavior)
- g. None of the above

Note: Questions 8-9 refer to the classes defined <u>below</u>.

```
class FlyingMachine {
public:
    FlyingMachine() {}
    void fly() {cout << "In FlyingMachine fly()"; }
};

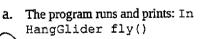
class HangGlider : public FlyingMachine {
public:
    virtual void crash() {cout << "HangGlider crashing"; }
    void fly() { cout << "In HangGlider fly()"; }
};</pre>
```

8. Given the above classes, what would be the result of:

```
int main() {
    FlyingMachine* flyingMachinePtr = new HangGlider();
    FlyingMachinePtr->crash();
}
```

- a. The program runs and prints: HangGlider crashing
- b. The program runs and prints: FlyingMachine crashing
- c. The program compiles but has a runtime error
- Given the above classes, what would be the result of:

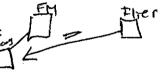
```
int main() {
    HangGlider hanger;
    FlyingMachine flier;
    flier = hanger;
    flier.fly();
}
```



The program runs and prints: In FlyingMachine fly()

c. Runtime error.

- d. Compilation error because there is no HangGlider constructor
 - Compilation error other than (d).
 - f. None of the above



- d. Compilation error because hanger cannot be assigned to flier.
- e. Compilation error because fly is not virtual.
- f. Other compilation error.
- g. None of the above

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10. Given

```
class Base {
  public:
     virtual void display() { cout << "Base: " << n << endl; }
  protected:
     int n = 5;
  };

class Derived : public Base {
  public:
     virtual void display() { cout << "Derived: " << n << endl; }
  };

int main() {
    Derived der;
    der.display();
}</pre>
```

What is the result of compiling and running the above code?

a) Outputs:
Base: 5

Outputs: Derived: 5

c) Fails to compile because the member variable n is being set in the class, instead of in the constructor.

- d) Fails to compile because the member variable n is protected. つの けら のった やってんたい
- e) Runtime error (or undefined behavior)
- f) None of the above.

11. Given:

What will be the result of compiling and running the program?

The program runs and prints:

abc:0

The

The program runs and prints: def: 0) The program runs and prints:

c. The program runs and prints: def:17

- d. The program fails to compile
- e. The program compiles and runs but doesn't print anything
- f. The program compiles but crashes with no output
- g. None of the above.

12. Given:

```
class Member {
public:
    Member() {cout << 1;}
    ~Member() {cout << 2;}
};

class Base {
public:
    Base() {cout << 3;}
    ~Base() {cout << 4;}
};

class Derived : public Base {
    Member member;
    Derived() {cout << 5;}
    ~Derived() {cout << 6;}
};

int main() {
    Derived der;</pre>
```

1352Ub

What is the output?

135246

- b. 135642
- c. 153264
- d. 153462
- e. 315426
- (f) 315624
- q. 351462

- h. 351264
- i. 513624
- j. 513426
- k. 531642
- l. 531246
- m. Fails to compile
- n. Runtime error (or undefined behavior)

Initializes Parents then privates then itself Deletes itself privates & Parents

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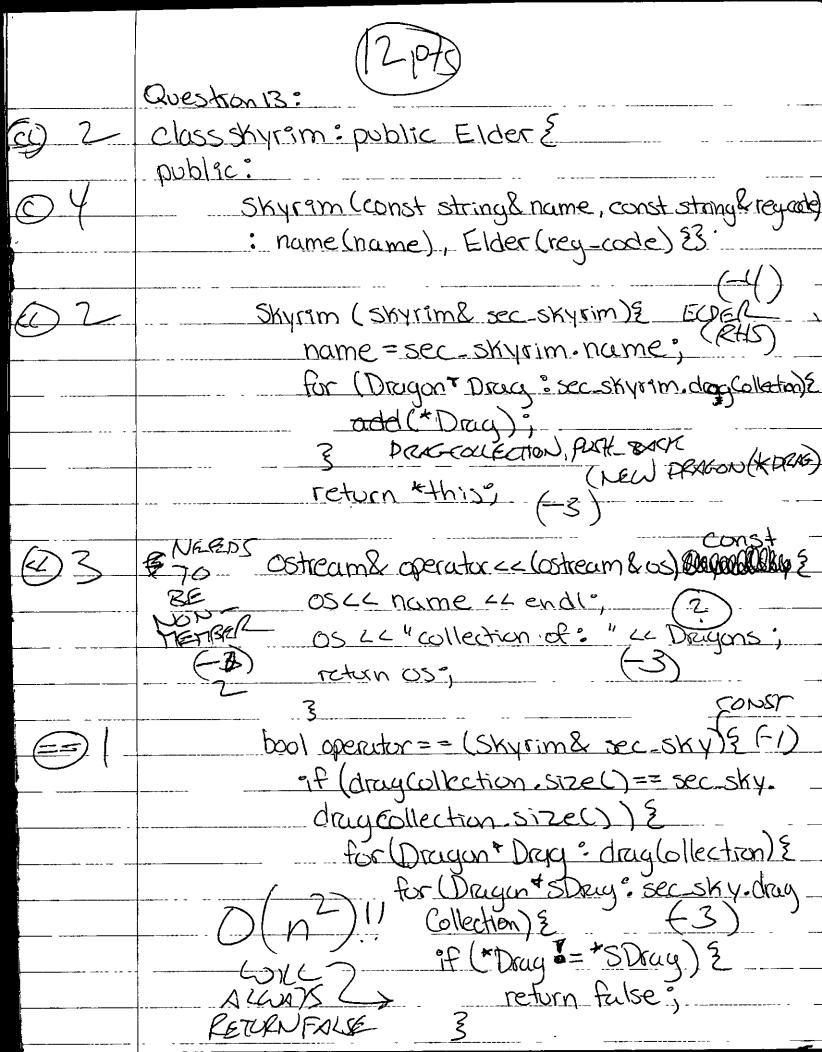
Blue book

Answer question 13 in your blue book.

- 13. Define a class **Skyrim** (just that class and nothing else)
 - The Skyrim class will inherit from the class Elder.
 - Elder
 - has a constructor that takes a string representing your registration code.
 - It also has any necessary operators and supports copy control. You should not need to know anything more about the class.
 - NB: you are not responsible for defining the Elder class.
 - Skyrim has two fields, the player's name and a collection of Dragon pointers. There may be lots of different types of Dragons, but we won't be responsible for defining those derived classes.
 - The Dragons will all be on the heap. In fact there is a method that you are <u>not responsible</u> for, called add, that creates the Dragons on the heap and inserts their addresses into the collection.
 - NB: you are <u>not responsible</u> for defining the Dragon class.
 - Dragons support copy control, along with all necessary operators

You are responsible for defining the Skyrim class and providing the following functiononality:

- A constructor taking in the player's name and registration code.
 - · Copy control.
 - Naturally, copying should involve making a deep copy. Don't just copy pointers!
- An output operator.
 - You may choose the format. Obviously all of the information you have about your Skyrim instance should be included.
 - Don't worry about printing information contained in the Elder class.
- An equality operator.
 - Two Skyrim instancess are considered equal if all of the corresponding Dragons are equal.
 - I.e. there are the same number of Dragons
 - and each Dragon in one Skyrim matches the Dragon in the same position of the other Skyrim.
 - NB, the Dragons do not have to have the same address to be "equal".



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| - F | rivate: |
| | string name; |
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