2143 - OOP
Fall 2022
Exam 2
April 4, 2023

Name: ____________________

READ THESE INSTRUCTIONS

- Use pencil only
- Do not remove the staple from your exam.
- Do not crumple or fold your exam.
- Handwriting that is illegible (messy, small, not straight) will lose points.
- Circle the correct answer in multiple choice questions.
- Answer all questions in the provided space directly on the test.
- If your answer will not fit in the space (IT SHOULD) use the blank sheets at the end of the exam. Write *"On Back"* at end of question and label that question clearly on the back sheets.
- Help me ... help you!

Failure to comply will result in loss of letter grade

1. (2 points) Write a single C++ statement that dynamically allocates a single int and initializes it to 99.

   A. int x = 99;

   B. int x{99};

   C. int *p = new int[99];

   D. int *p = new int{99};

```
class Character {
protected:
    string name;
public:
    void print() {
        cout « name « endl;
    }
    void print(string x) {
        cout « name « X« endl;
    }
};

class Wizard : public Character {
public:
    void print() {
        cout « name « " is a Wizard!" « endl;
    }
};
```

2. (2 points) Class **Wizard** is ____ the print method in **Character**

   A. Overloading

   B. Overriding

   C. Extending

   D. Instantiating

3. (2 points) The **Print** method is ____ in class **Character**

   A. Overloaded

   B. Overridden

   C. Abstracted

   D. Purely Abstracted

4. (2 points) How can we make a class abstract?

   A. By making all member functions constant.

   B. By defining at least one member function as a pure virtual function.

   C. By declaring it abstract using the static keyword.

   D. By declaring it abstract using the virtual keyword.

5. (2 points) Which of the following statement is correct with respect to the use of **friend** keyword inside a class?

   A. A private data member can be declared as a friend.

   B. A class may be declared as a friend.

   C. An object may be declared as a friend.

   D. We can use friend keyword as a class name.

6. (2 points) Which of the following keywords is used to control access to a class member?

   A. Default

   B. Break

   C. Protected

   D. Override

7. (2 points) Like private members, protected members are inaccessible outside of the class. However, they can be accessed by?

   A. Friend Classes

   B. Friend Functions

   C. Functions

   D. Derived Classes

   E. All of the above

8. (2 points) Which of the following can access *private data members* or *private member functions* of a class?

   A. Any function in the program.

   B. All global functions in the program.

   C. Any member function of that class.

   D. Only public member functions of that class.

9. (2 points) Which of the following type of data member can be shared by *all instances* of its class?

   A. Public

   B. Inherited

   C. Static

   D. Friend

10. (2 points) Which of the following is also known as an instance of a class?

   A. Friend Functions

   B. Object

   C. Member Functions

   D. Member Variables

11. (2 points) A *constructor* is executed when _____?

    A. an object is created

    B. an object is used

    C. a class is declared

    D. an object goes out of scope.

12. (2 points) How many objects can be created from an abstract class?

    A. Zero

    B. One

    C. Two

    D. As many as we want

13. (2 points) What does the class definitions in the following code represent?

```
class Character
{
    string name;
};
class Wizard: public Character
{
    int spellStrength;
};
```

    A. A character **has-a** name

    B. A Wizard **overrides** Character

    C. A Wizard **is-a** Character

    D. A Character **is-a** Wizard

14. (2 points) Which of the following can be overloaded?

    A. Object

    B. Functions

    C. Operators

    D. Both B and C

15. (2 points) Which of the following means "*The use of an object of one class in the definition of another class*"?

    A. Encapsulation

    B. Inheritance

    C. Composition

    D. Abstraction

16. (2 points) Which of the following is the only technical difference between structures and classes in C++?

    A. Member function and data are by default *protected* in structures but *private* in classes.

    B. Member function and data are by default *private* in structures but *public* in classes.

    C. Member function and data are by default *public* in structures but *private* in classes.

    D. Member function and data are by default *public* in structures but *protected* in classes.

17. (2 points) Which of the following concepts means "determine at runtime" what method to invoke?

    A. Static Invocation

    B. Dynamic Invocation

    C. Dynamic Polymorphism

    D. Static Polymorphism

    E. None of these

18. (2 points) In the code snippet below, we have an example of:

```
class Base {
   public:
    void print() {cout « ”Base Function” « endl;}
};

class Derived : public Base {
   public:
    void print() {}cout « ”Derived Function” « endl;}
};
int main() {
    Derived derived1;
    derived1.print();
}
```

    A. Function overriding

    B. Function overloading

    C. Compile time polymorphism

    D. Run time polymorphism

    E. A & C

    F. B & D

19. (2 points) In the snippet below, if I wanted to make **Character** an abstract class, I would have to:

```
class Character {
protected:
    string name;
public:
    void print() {
        cout « name « endl;
    }
};

class Wizard : public Character {
public:
    void print() {
        cout « name « ” is a Wizard!” « endl;
    }
};
```

A. Make **Character::print** virtual

B. Not implement print in Character

C. Set **Character::print() = 0;**

D. All of the above

E. None of the above

20. (2 points) Which of the following can be an **object** :

A. Concrete Class.

B. Abstract Class.

C. Pure Virtual Method.

D. None of the above

21. (2 points) What is the one thing that is necessary for **run time polymorphism** ?

A. virtual keyword

B. pointers

C. pure virtual method

D. None of the above

22. (2 points) We typically choose **Inheritance** over **Composition** ?

A. True

B. False

23. (2 points) When a derived class inherits from more than one superclass directly, we call it?

A. Hierarchical Inheritance

B. Multi-Level Inheritance

C. Multiple Inheritance

D. Dynamic Inheritance

24. (15 points) Rewrite the snippet below so that the Kid can access his dad private stash of alcohol. The alcohol attribute must stay private.

```
class Dad {
private:
    string alcohol;

protected:
public:
};

class Kid {

protected:
public:
    Kid() {
    }

};
```

25. (15 points) Rewrite the necessary component of the code snippet below, so that the print method in Character must be implemented in both sub-classes.

```
class Character {
protected:
    int name;
public:
    void print() {
        cout « name « endl;
    }
};
class Wizard : public Character {
public:
    void print() {
        cout « name « ” is a Wizard!” « endl;
    }
};
class Warrior : public Character {
public:
    void print() {
        cout « name « ” is a warrior!” « endl;
    }
};
```