



COLLEGE OF ENGINEERING & TECHNOLOGY

Department : Computer Engineering (Cairo Branch)

Lecturer : Dr. Hisham Salah Rashad

Course Name : Object Oriented Programming

Course Code : CC 316

Total Marks: 40

Date

: 27-05-2019

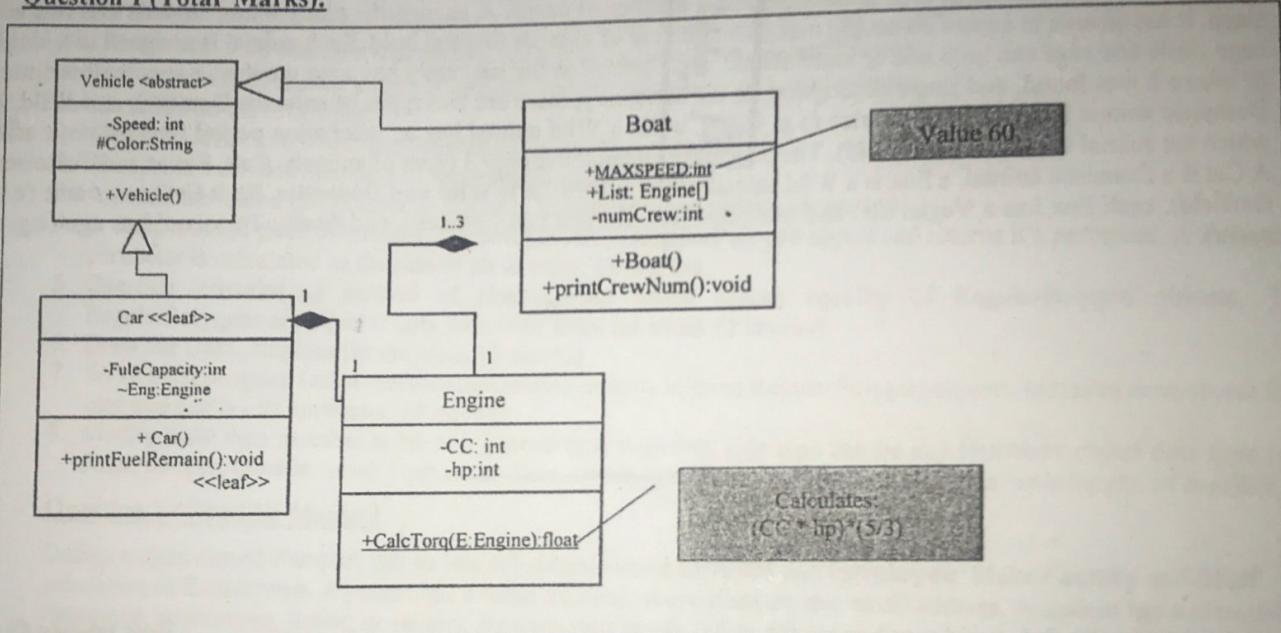
Start Time: 9:00

Time allowed : 2 Hours

Final Examination Paper

Attempt all questions.

Question 1 (Total Marks):



For the given UML class diagram do the following:

1. Write the java code which implements the Diagram. (13 marks)
2. Apply Encapsulation concept to class Engine. (2 marks)
3. Add argument-based constructor to all classes. (4 marks)
4. Add copy constructor to all classes. (4 marks)
5. In all classes override **toString()** method (4 marks)
6. In "**printFuelRemain()**" method code print to screen the FuleCapacity value, while in "**printCrewNum()**" method code print to screen numCrew value. (1 mark)
7. In a separate class and using Polymorphism, write a generic method which can accept any vehicle object. The method should call "**printFuelRemain()**" if the object was a car, otherwise should call "**printCrewNum()**" if the object was a Boat. (2 marks)

أمينة مبروك

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Question 2 (Total 10 Marks):

Draw a UML class diagram for the following problem:

Consider a computer program for managing a simple Animal Sanctuary where number of animals are rehabilitated. The Sanctuary is composed of N Animal Yards. Each Yard is an enclosed land area where animals can freely run or walk. A Yard can be described by its area in hectares and a number of cages. A cage is the place where animals can rest and sleep. It has an area in square meter and maximum number of animals that can hold. Each animal is assigned to a single cage while one cage can hold one or more animal. Each animal in the sanctuary has a tag number, a simple description of where it was found, and shape description. In the Sanctuary, there are two types of animals: Domestic and Wild. A Domestic animal has an adoption price (e.g. 100\$), while a Wild animal has an incubation period (e.g. 30 days after which the animal is set free to the wild). The Sanctuary rehabilitates only 3 types of animals: Cats, Foxes and Tortoises. A Cat is a Domestic animal, a Fox is a Wild animal, while a Tortoise is Wild and Domestic. Each Cat has a name (e.g. Garfield), each Fox has a Vegan diet and Meat diet (e.g. Berries and Chicken), and finally Tortoises' has age (e.g. 2 years).

Best wishes ☺ ☺



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Final Exam

Attempt all the following questions.

Question 1 (Total 20 Marks):

In an N-sided regular polygon, all sides have the same length and all angles have the same degree (i.e., the polygon is both equilateral and equiangular). Design a class named **RegularPolygon** that contains:

- An int data field named **n** that defines the number of sides in the polygon
- A double data field named **side** that stores the length of the side.
- An int data field named **x** that defines the x-coordinate of the polygon's center.
- An int data field named **y** that defines the y-coordinate of the polygon's center.

In this scope do the following:

1. Write the java code which implements RegularPolygon. (1 marks)
2. Encapsulate all data members of RegularPolygon. (3 marks)
3. A parameter-based constructor to initialize RegularPolygon object. (1 marks)
4. A static method **getPerimeter(...)** which receives RegularPolygon object and returns it's perimeter. A Polygon's perimeter is calculated as the sum of all its sides. (2 marks)
5. Override **equals(...)** method of class Object which checks equality of RegularPolygon objects. Two RegularPolygons are equal if only both their sides are equal. (2 marks)
6. Draw the UML diagram for the class. (3 marks)
7. Write a test program (main method) that creates an array of three RegularPolygon objects. Initialize each object from user and display its perimeter. (4 marks)
8. Modify **side** data member to be of a generic type such that, side type can be any **Number** object data type (e.g. Float, Integer, Double...etc). Update the class, setters, getters and getperimenter() code accordingly. (4 marks)

Question 2 (Total 20 Marks):

Design a class named **Person** and its two subclasses named **Student** and **Employee**. Make **Faculty** and **Staff** subclasses of **Employee**. A person has a name, address, phone number, and email address. A student has a class status (freshman, sophomore, junior, or senior). An employee has an office, salary, and year hired. A faculty member has office hours and a rank. A staff member has a title.

In this scope do the following:

1. Write the java code which implements the problem. (2.5 marks)
2. In each class define: No-argument (default) and Copy constructors. Make use of the inheritance tree when appropriate. Use any default values. (5 marks)
3. Define constants representing freshman, sophomore, junior, and senior in class student. (2 marks)
4. Override the **toString()** method in each class. Make use of the inheritance tree when appropriate. (2 marks)
5. Implement an interface named **Researcher** which includes the method **preferredTopics()**. The method should print a string representing preferred research topics. Implement the interface in Faculty class. (2 marks)
6. Draw the UML diagram which describes all your work in 1, 2, 3, 4 and 5. (3 marks)
7. Write a test program that creates a **Faculty** and a **Staff** objects and print their states using **toString()** method. (1.5 marks)
8. Create a method, in class person, named **printPersonType(...)**. The method accepts as a parameter one object only. The parameter may be of any of the following types: Person, Student, Faculty, Staff or Employee. The method should print on screen the parameter's class name. (2 marks)



DEPARTMENT: COMPUTER ENGINEERING
LECTURER : Prof. Dr. Amr Badr
COURSE TITLE: Object-Oriented Programming
COURSE CODE: CC316 MARKS/Time: 40/120min

ANSWER ALL QUESTIONS

1-Write a program that has a class that encapsulates an expanding or shrinking 2D array (Flex matrix). The program should have the following methods:

- a-constructors
- b-add 2 matrices
- c-multiply 2 matrices
- d-add a column at location j
- e-add a row at location i
- f-delete column at location j
- g-delete row at location i
- h-find max or min element in matrix
- i-sort matrix row-wise or column-wise
- j-a toString method
- k-main method

The program should be generic with exception handling and stores/retrieves from files.

(30 points)

2-Design and implement a class hierarchy for geometric shapes. Include an abstract base class and classes for a point, rectangle, ellipse, circle, square, and a class for testing these shapes. The methods included are drawShape and getArea. Draw the class hierarchy implemented.

[10 points]



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COURSE TITLE: Object-Oriented Programming
COURSE CODE: CC316 **MARKS/Time:** 40/120min

ANSWER ALL QUESTIONS

Write a Java program that implements 2 classes:

1-a 'vector' class with data structure an array of integers of finite length, its constructors and methods:

- a- Add 2 vectors
- b- Multiply 2 vectors
- c- Read data from a file
- d- Write data to a file

2-a 'matrix' class with data structure a 2-dimensional array of integers of size m x n, its constructors and methods:

- a- Add 2 matrices
- b- Pre-multiply the matrix by a vector
- c- Post-multiply the matrix by a vector
- d- Read data from a file
- e- Write data to a file

Inherit a third class from class 'matrix' called 'matrixEnergy' with methods:

I- 'Energy' method which has 2 vectors v1 and v2 as parameters and multiplies:

$$E = v1 * Matrix * v2$$

Where the resultant E is an integer number.

II- A method to print the energy E.

Implement a 'main' method to test program. Please note that you should implement an 'Exception Handler' for error handling all throughout the program.



COLLEGE OF ENGINEERING & TECHNOLOGY

Department : Computer Engineering

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Course Name : Object Oriented Programming

Course Code : CC316 Total Marks: 40

Date: Mon. June. 6-2016 Start time: 12:00 p.m.

Time allowed: 2 Hours

o)

o) Analyze the following code.

```
public class Test {  
    int x;  
    public Test(String t) {  
        System.out.println("Test");  
    }  
    public static void main(String[] args) {  
        Test test = new Test();  
        System.out.println(test.x);  
    }  
}
```

- A) The program has a compile error because x has not been initialized.
- B) The program has a compile error because Test does not have a default constructor.
- C) The program has a compile error because you cannot create an object from the class that defines the object.
- D) The program has a compile error because System.out.println method cannot be invoked from the constructor.

6) The getValue() method is overridden in two ways. Which one is correct?

6) _____

```
/* I: */  
public class Test {  
    public static void main(String[] args) {  
        A a = new A();  
        System.out.println(a.getValue());  
    }  
}  
class B {  
    public String getValue () {  
        return "Any object";  
    }  
}  
class A extends B {  
    public Object getValue () {  
        return "A string";  
    }  
}  
/* II: */  
public class Test {  
    public static void main(String[] args) {  
        A a = new A();  
        System.out.println(a.getValue());  
    }  
}  
class B {  
    public Object getValue () {  
        return "Any object";  
    }  
}  
class A extends B {  
    public String getValue () {  
        return "A string";  
    }  
}
```

A) I

B) II

C) Both I and II

D) Neither



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v) Analyze the following code:

```
public class Test {
    public static void main(String[] args) {
        new B();
    }
}

class A {
    int i = 7;
    public A() {
        System.out.println("i from A is " + i);
    }
    public void setI(int i) {
        this.i = 2 * i;
    }
}

class B extends A {
    public B () {
        setI(20);
        //System.out.println("i from B is " + i);
    }
    public void setI(int i) {
        this.i = 3 * i;
    }
}
```

- A) The constructor of class A is called and it displays "i from A is 40."
- B) The constructor of class A is called and it displays "i from A is 7."
- C) The constructor of class A is called and it displays "i from A is 60."
- D) The constructor of class A is not called.

^) Which of the following statements are true?

8) _____

- A) A method can be overloaded in the same class.
- B) If a method overloads another method, these two methods must have the same signature.
- C) If a method overrides another method, these two methods must have the same signature.
- D) A method in a subclass can overload a method in the superclass.
- E) A method can be overridden in the same class.

*) The equals method is defined in the Object class. Which of the following is correct to override it in the String class?

9) _____

- A) public boolean equals(Object other)
- C) public static boolean equals(Object other)

- B) public boolean equals(String other)
- D) public static boolean equals(String other)



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10) In OOP, a reference variable can reference a subtype object. This is called _____. 10)

A) encapsulation

B) inheritance

C) polymorphism

D) abstraction

11) What exception type does the following program throw? 11)

```
public class Test {  
    public static void main(String[] args) {  
        Object o = new Object();  
        String d = (String)o;  
    }  
}
```

A) ArithmeticException

B) ArrayIndexOutOfBoundsException

C) StringIndexOutOfBoundsException

D) ClassCastException

E) No exception

12) Which of the following statements are true about abstract classes? 12)

A) A subclass can be abstract even if its superclass is concrete.

B) An abstract class cannot be instantiated using the new operator.

C) An abstract method cannot be contained in a nonabstract class.

D) It is possible to declare an abstract class that contains no abstract methods.

E) If a subclass of an abstract superclass does not implement all the abstract methods, the subclass must be declared abstract.

13) In JDK 1.5, analyze the following code. 13)

Line 1: Integer[] intArray = {1, 2, 3};

Line 2: int i = intArray[0] + intArray[1];

Line 3: int j = i + intArray[2];

Line 4: double d = intArray[0];

A) It is OK to mix an int value with an Integer object in an expression in Line 3.

B) It is OK to assign 1, 2, 3 to an array of Integer objects in JDK 1.5.

C) Line 4 is OK. An int value from intArray[0] object is assigned to a double variable d.

D) It is OK to automatically convert an Integer object to an int value in Line 2.

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14) What is the output of the following code?

14) _____

```
import javafx.beans.property.IntegerProperty;
import javafx.beans.property.SimpleIntegerProperty;
public class Test {
    public static void main(String[] args) {
        IntegerProperty d1 = new SimpleIntegerProperty(1);
        IntegerProperty d2 = new SimpleIntegerProperty(2);
        d1.bindBidirectional(d2);
        System.out.print("d1 is " + d1.getValue() + " and d2 is " + d2.getValue());
        d1.setValue(3);
        System.out.println("d1 is " + d1.getValue() + " and d2 is " + d2.getValue());
    }
}
```

- A) d1 is 1 and d2 is 2, d1 is 3 and d2 is 3 B) d1 is 2 and d2 is 2, d1 is 3 and d2 is 3
C) d1 is 2 and d2 is 2, d1 is 2 and d2 is 3 D) d1 is 1 and d2 is 2, d1 is 1 and d2 is 3

15) Which of the following statements correctly creates an ImageView object?

15) _____

- A) new ImageView("http://www.cs.armstrong.edu/liang/image/us.gif");
B) new ImageView(new Image("http://www.cs.armstrong.edu/liang/image/us.gif"));
C) new ImageView(new Image("image/us.gif"));
D) new ImageView("image/us.gif");

16) The _____ properties are defined in the javafx.scene.shape.Ellipse class.

16) _____

- A) radius B) center C) radius D) centerX

17) Which of the following statements are true?

17) _____

- A) An inner class can be declared static. A static inner class can be accessed using the outer class name. A static inner class cannot access nonstatic members of the outer class.
B) An inner class supports the work of its containing outer class and is compiled into a class named OuterClassName\$InnerClassName.class.
C) Inner classes can make programs simple and concise.
D) An inner class can be declared public or private subject to the same visibility rules applied to a member of the class .



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18)

١٨) Fill in the code below in the underline:

```
public class Test {  
    public static void main(String[] args) {  
        Test test = new Test();  
        test.setAction2(______);  
    }  
    public void setAction2(T2 t) {  
        t.m(4.5);  
    }  
}  
interface T2 {  
    public void m(Double d);  
}
```

- A) e -> System.out.print(e)
B) (e) -> {System.out.print(e);}
C) () -> System.out.print(e)
D) (e) -> System.out.print(e)

١٩) To declare an interface named A with two generic types, use _____. 19)

- A) public interface A(E, F) { ... }
B) public interface A(E) { ... }
C) public interface A<E> { ... }
D) public interface A<E, F> { ... }

٢٠) To create a list to store integers, use _____. 20)

- A) ArrayList<Object> list = new ArrayList<Integer>();
B) ArrayList<int> list = new ArrayList<int>();
C) ArrayList<Number> list = new ArrayList<Integer>();
D) ArrayList<Integer> list = new ArrayList<Integer>();



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Programming:

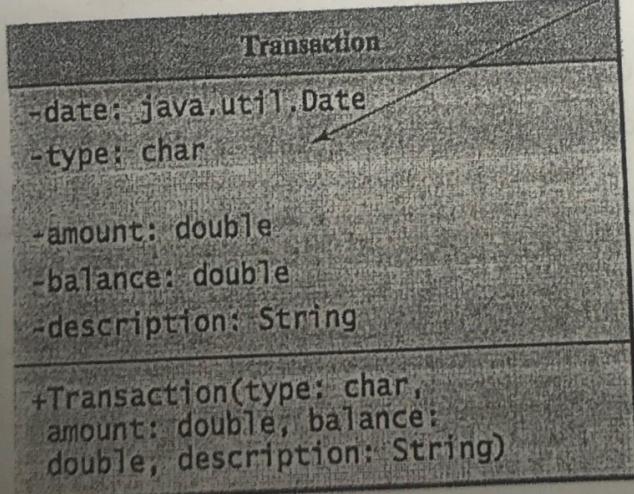
[20 points]

21) Design an Account class as follows:

[10 points]

- A private int data field named id for the account (default 0).
- A private double data field named balance for the account (default 0).
- A private double data field named annualInterestRate that stores the current interest rate (default 0). Assume all accounts have the same interest rate.
- A private Date data field named dateCreated that stores the date when the account was created.
- A data field name of the String type to store the name of the customer.
- A no-arg constructor that creates a default account.
- A constructor that creates an account with the specified id and initial balance.
- A constructor that constructs an account with the specified name, id, and balance.
- The accessor and mutator methods for id, balance, and annualInterestRate.
- The accessor method for dateCreated.
- A method named getMonthlyInterestRate() that returns the monthly interest rate.
- A method named getMonthlyInterest() that returns the monthly interest.
- A data field named transactions whose type is ArrayList that stores the transaction for the accounts. Each transaction is an instance of the Transaction class. The Transaction class is defined as shown in the Figure.

The getter and setter methods for these data fields are provided in the class, but omitted in the UML diagram for brevity.



The date of this transaction.

The type of the transaction, such as 'W' for withdrawal, 'D' for deposit.

The amount of the transaction.

The new balance after this transaction.

The description of this transaction.

Construct a Transaction with the specified date, type, balance, and description.



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- In the Account class, Define a method named withdraw that withdraws a specified amount from the account, then adds a transaction to the transactions array list..
 - In the Account class, Define a method named deposit that deposits a specified amount to the account, then adds a transaction to the transactions array list..
- a) Draw the UML diagram for the Account class, and its association with the shown Transaction class.
- b) Implement the Account class. (*Hint:* The method getMonthlyInterest() is to return monthly interest, not the interest rate. Monthly interest is balance * monthlyInterestRate. monthlyInterestRate is annualInterestRate / 12. Note that annualInterestRate is a percentage, e.g., like 4.5%. You need to divide it by 100.)
- c) Write a test program that:
 - i) creates an Account object with an account ID of 1122, a balance of \$20,000, and an annual interest rate of 4.5%. Use the withdraw method to withdraw \$2,500, use the deposit method to deposit \$3,000, and print the balance, the monthly interest, and the date when this account was created.
 - ii) creates another Account object with annual interest rate 1.5%, balance 1000, id 1122, and name George. Deposit \$30, \$40, and \$50 to the account and withdraw \$5, \$4, and \$2 from the account. Print an account summary that shows account holder name, interest rate, balance, and all transactions.

22) Write a class named Octagon that extends GeometricObject and implements the Comparable and Cloneable interfaces. Assume that all eight sides of the octagon are of equal length. The area can be computed using the following formula:

[6 points]

$$area = (2 + 4) * side * side$$

- a) Draw the UML diagram that involves Octagon, GeometricObject, Comparable, and Cloneable.
- b) Write a method that sums the areas of all the geometric objects in an array. The method signature is:
`public static double sumArea(GeometricObject[] a)`
- c) Write a test program that:
 - i) creates an Octagon object with side value 5 and displays its area and perimeter. Create a new object using the clone method and compare the two objects using the compareTo method.
 - ii) creates an array of five objects (one Octagon, two circles and two rectangles) and computes their total area using the sumArea method.

23) Write the following method that returns a new ArrayList. The new list contains the non-duplicate elements from the original list.

[4 points]

`public static <E> ArrayList<E> removeDuplicates(ArrayList<E> list)`



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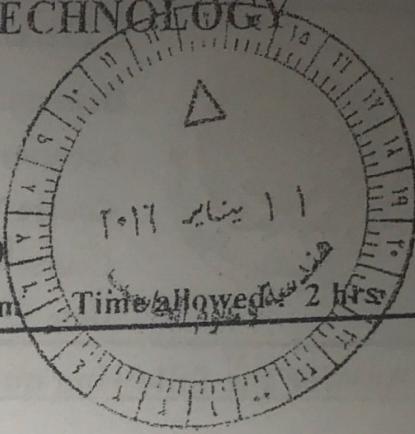
Total Marks: 40

Date

: 11/1/2016

Start time : 12pm

Time allowed: 2 hrs



Final Examination Paper

Student Name	
I.D	

Marks

Question	Actual	Available
1:26		26
27:40		14
Total		30
Lecturer	Name	Sign
	Date	



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Answer the following questions:

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Most programming languages that are in use today are:

- A) object-oriented B) procedural C) functional D) logic

1) _____

2) Methods are commonly used to:

- A) speed up the compilation of a program B) document the program
C) emphasize certain parts of the logic D) break a problem down into small manageable pieces

2) _____

3) Analyze the following code.

```
public class Test {  
    public static void main(String[] args) {  
        System.out.println(max(1, 2));  
    }  
    public static double max(int num1, double num2) {  
        System.out.println("max(int, double) is invoked");  
        if (num1 > num2)  
            return num1;  
        else  
            return num2;  
    }  
    public static double max(double num1, int num2) {  
        System.out.println("max(double, int) is invoked");  
        if (num1 > num2)  
            return num1;  
        else  
            return num2;  
    }  
}
```

3) _____

- A) The program cannot compile because the compiler cannot determine which max method should be invoked.
B) The program runs and prints 2 followed by "max(int, double)" is invoked.
C) The program runs and prints "max(int, double) is invoked" followed by 2.
D) The program cannot compile because you cannot have the print statement in a non-void method.
E) The program runs and prints 2 followed by "max(double, int)" is invoked.



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4) When an object, such as a String, is passed as an argument, it is:

4) _____

- A) actually a reference to the object that is passed
- B) encrypted
- C) necessary to know exactly how long the string is when writing the program
- D) passed by value like any other parameter value

5) A class specifies the _____ and _____ that a particular type of object has. 5) _____

- A) relationships; methods
- B) fields; methods
- C) fields; object names
- D) relationships; object names

6) Which of the following statements are true?

6) _____

- A) At least one constructor must always be defined explicitly.
- B) The default constructor is a no-arg constructor.
- C) Every class has a default constructor.
- D) A default constructor is provided automatically if no constructors are explicitly declared in the class.

7) Data hiding, which means that critical data stored inside the object is protected from code outside the object, is accomplished in Java by:

7) _____

- A) using the private access specifier on the class fields
- B) using the private access specifier on the class definition
- C) using the private access specifier on the class methods
- D) using the public access specifier on the class methods

8) Analyze the following code:

```
public class Test {  
    public static void main(String[] args) {  
        A a = new A();  
        a.print();  
    }  
}
```

```
class A {  
    String s;  
    A(String s) { this.s = s; }  
    void print() {  
        System.out.println(s);  
    }  
}
```

- A) The program has a compilation error because class A does not have a default constructor.
- B) The program would compile and run if you change A a = new A() to A a = new A("5").
- C) The program has a compilation error because class A is not a public class.
- D) The program compiles and runs fine and prints nothing.

7



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9) Methods that operate on an object's fields are called:

A) public methods

B) private methods

C) instance variables

D) instance methods
9) _____

10) Static methods can only operate on _____ fields.

A) static

B) local

C) instance

D) global
10) _____

11) Which of the following is NOT true about static methods?

A) They are called from an instance of the class.

B) They are often used to create utility classes that perform operations on data, but have no need to collect and store data.

C) They are created by placing the key word static after the access specifier in the method header.

D) It is not necessary for an instance of the class to be created to execute the method.
11) _____

12) You cannot use the == operator to compare the contents of:

A) objects

B) integers

C) Boolean values

D) strings
12) _____

13) In an inheritance relationship:

A) The subclass constructor always executes before the superclass constructor

B) The unified constructor always executes first regardless of inheritance

C) The constructor with the lowest overhead always executes first regardless of inheritance

D) The superclass constructor always executes before the subclass constructor
13) _____

14) What key word can you use to call a superclass constructor explicitly?

A) goto

B) extends

C) super

D) this
14) _____

15) Replacing inadequate superclass methods with more suitable subclass methods is known as what?

A) Method overloading

B) Tactical inheritance

C) Method overriding

D) Method upgrading
15) _____



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16) Look at the following code. The method in line _____ will override the method in line _____

16) _____

```
Line 1     public class ClassA
Line 2     {
Line 3         public ClassA() {}
Line 4         public int method1(int a){}
Line 5         public double method2(int b){}
Line 6     }
Line 7     public ClassB extends ClassA
Line 8     {
Line 9         public ClassB(){}
Line 10        public int method1(int b, int c){}
Line 11        public double method2(double c){}
Line 12    }
```


17) A protected member of a class may be directly accessed by:

- A) methods in the same package
 - B) methods of the same class
 - C) methods of a subclass
 - D) All of the above

18) When a method is declared with the _____ modifier, it cannot be overridden in a subclass. 18)

- A) super B) final C) public D) extends

19) A subclass can directly access:

- A) only protected and private members of the superclass
 - B) only public and protected members of the superclass
 - C) all members of the superclass
 - D) only public and private members of the superclass

20) If a class contains an abstract method:

- A) the method will have only a header, but not a body, and end with a semicolon
 - B) the method must be overridden in subclasses
 - C) you cannot create an instance of the class
 - D) All of the above



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21) _____

21) Given the following code which of the following is TRUE?

```
public class ClassB implements ClassA{ }
```

- A) ClassB must override each method in ClassA.
- B) ClassA must override each method in ClassB.
- C) ClassA inherits from ClassB.
- D) ClassB inherits from ClassA.

22) _____

22) All fields declared in an interface:

- A) have private access
- B) have protected access
- C) must be initialized in the class implementing the interface
- D) are final and static

23) _____

23) Look at the following code. Which line has an error?

```
Line 1 public interface 'nterface1  
Line 2 {  
Line 3     int FIELDA = 55;  
Line 4     public int methodA(double){}  
Line 5 }
```

- A) 1
- B) 2
- C) 3
- D) 4

24) _____

24) Look at the following code. Which line in ClassA has an error?

```
Line 1 public interface MyInterface  
Line 2 {  
Line 3     int FIELDA = 55;  
Line 4     public int methodA(double);  
Line 5 }  
Line 6 public class ClassA implements MyInterface  
Line 7 {  
Line 8     FIELDA = 60;  
Line 9     public int methodA(double) { }  
Line 10 }
```

- A) 6
- B) 7
- C) 8
- D) 9



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25) An anonymous inner class must:

25) _____

- A) extend another class
- B) implement an interface
- C) either A or B
- D) both A and B

26) Which of the following statements are true?

26) _____

- A) Inner classes can make programs simple and concise.
- B) An inner class supports the work of its containing outer class and is compiled into a class named OuterClassName\$InnerClassName.class.
- C) An inner class can be declared static. A static inner class can be accessed using the outer class name. A static inner class cannot access nonstatic members of the outer class.
- D) An inner class can be declared public or private subject to the same visibility rules applied to a member of the class.

27) This is a special type of expression used to create an object that implements a functional interface.

27) _____

- A) sigma
- B) beta
- C) alpha
- D) lambda

28) Which of the following is an example of a lambda expression?

28) _____

- A) IntCalculator multiplier = x -> x * factor;
- B) IntCalculator = new divider(x, 2);
- C) int x = x * factor;
- D) All of the above

29) Which of the following is the best for generating random integer 0 or 1?

29) _____

- A) (int)(Math.random() + 0.5)
- B) (int)Math.random()
- C) (int)Math.random() + 1
- D) (int)(Math.random() + 0.2)
- E) (int)(Math.random() + 0.8)

30) Java allows you to create objects of this class in the same way you would create primitive variables.

30) _____

- A) Random
- B) Scanner
- C) String
- D) PrintWriter

31) _____ is a library of classes that do not replace _____, but provide an improved alternative for creating GUI applications.

31) _____

- A) JFC, AWT
- B) AWT, Swing
- C) Swing, AWT
- D) JFC, Swing



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32)

32) Programs that operate in a GUI environment must be:

- A) dialog boxes B) event driven C) in color D) layout managers

33)

33) Which one of the following GUI components is considered to be a container?

- A) Frame B) Label C) Button D) Slider

34)

34) Analyze the following code:

```
+import ....;
public class Test extends Application {
    @Override // Override the start method in the Application class
    public void start(Stage primaryStage) {
        Pane pane = new FlowPane();
        Button bt1 = new Button("Java");
        Button bt2 = new Button("Java");
        Button bt3 = new Button("Java");
        Button bt4 = new Button("Java");
        pane.getChildren().addAll(bt1, bt2, bt3, bt4);

        Scene scene = new Scene(pane, 200, 250);
        primaryStage.setTitle("Test"); // Set the stage title
        primaryStage.setScene(scene); // Place the scene in the stage
        primaryStage.show(); // Display the stage
    }

    public static void main(String[] args) {
        launch(args);
    }
}
```

- A) One button is displayed with the text "Java".
B) Two buttons are displayed with the same text "Java".
C) Three buttons are displayed with the same text "Java".
D) Four buttons are displayed with the same text "Java".

35)

35) The method _____ gets the contents of the text field tf.

- A) tf.getText() B) tf.getText(s) C) tf.getString() D) tf.findString()

36) To place a node in the left of a BorderPane p, use _____.

36)

- A) p.placeLeft(node); B) p.left(node);
C) p.setEast(node); D) p.setLeft(node);



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37) To register a source for an action event with a handler, use _____. 37) _____

- A) source.setActionHandler(handler)
- B) source.addAction(handler)
- C) source.addOnAction(handler)
- D) source.setOnAction(handler)

38) Which of the following statements are true? 38) _____

- A) A Button can fire a KeyEvent.
- B) A Button can fire a MouseEvent.
- C) A TextField can fire an ActionEvent.
- D) A Button can fire an ActionEvent.

39) Analyze the following code. 39) _____

```
+import ....;
public class Test extends Application {
    @Override // Override the start method in the Application class
    public void start(Stage primaryStage) {
        Button btOK = new Button("OK");
        btOK.setOnAction(new EventHandler<ActionEvent>() {
            public void handle(ActionEvent e) {
                System.out.println("The OK button is clicked");
            }
        });
        Scene scene = new Scene(btOK, 200, 250);
        primaryStage.setTitle("MyJavaFX"); // Set the stage title
        primaryStage.setScene(scene); // Place the scene in the stage
        primaryStage.show(); // Display the stage
    }
    public static void main(String[] args) {
        launch(args);
    }
}
```

- A) The message "The OK button is clicked" is displayed when you click the OK button.
- B) The handle method is not executed when you click the OK button, because no handler is registered with btOK.
- C) The program has a compile error because no handlers are registered with btOK.
- D) The program has a runtime error because no handlers are registered with btOK.

40) To handle the key pressed event on a pane p, register the handler with p using _____. 40) _____

- A) p.setOnKeyReleased(handler);
- B) p.setOnKeyTyped(handler);
- C) p.setOnKeyClicked(handler);
- D) p.setOnKeyPressed(handler);