King Saud University

College of Computer and Information Sciences
Computer Science Department

Course Code:	CSC 111
Course Title:	Introduction to Programming
Semester:	Fall 2010
Exercises Cover Sheet:	**Final Exam**

Student Name:	
Student ID:	
Student Section No.	

Tick the Relevant	Computer Science B.Sc. Program ABET Student Outcomes	Question No. Relevant Is Hyperlinked	Covering %
√	a) Apply knowledge of computing and mathematics appropriate to the discipline;	1,2,3	25
	b) Analyze a problem, and identify and define the computing requirements appropriate to its solution		
√	c) Design, implement and evaluate a computer-based system, process, component, or program to meet desired needs;	3,4,5	75
	d) Function effectively on teams to accomplish a common goal;		
	e) Understanding of professional, ethical, legal, security, and social issues and responsibilities;		
	f) Communicate effectively with a range of audiences;		
	g) Analyze the local and global impact of computing on individuals, organizations and society;		
	h) Recognition of the need for, and an ability to engage in, continuing professional development;		

√	**i) Use current techniques, skills, and tools necessary for computing practices.**		
	j) Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices;		
	k) Apply design and development principles in the construction of software systems of varying complexity;		

Name:	ID:	Section Time:
Instructor Name:		

Question 1: (4 Marks)

Give the UML class representation of the following Java class:

```
public class Network {
  private String [] nodeIPs;   private String [] buffers;
  private int count;           private int server;
//----------------------
  public Network(int size) {
    nodeIPs = new String[size];    buffers = new String [size];
    count = 0;                     server = -1;
  }
//-----------------------
  private int searchNodeByIP(String ip) {
    for (int i=0; i<count; i++) if (nodeIPs[i].equals(ip)) return i;
    return -1;
  }
//------------------------
  public boolean addNode(String ip) {
    int i = searchNodeByIP(ip);
    if (i == -1 && count<nodeIPs.length) {
      nodeIPs[count] = ip;      buffers[count] = null;     count++;
      return true;
    }
    return false;
  }
//----------------------
  public boolean removeNode(String ip) {
    int i = searchNodeByIP(ip);
    if (i != -1) {
      nodeIPs[i] = nodeIPs[count-1];      buffers[i] = buffers[count-1];
      if (server == i) server = count-1;
      count--;
      return true;
    }
    return false;
  }
//----------------------
  public boolean transfer(String from, String to, String msg) {
    int f = searchNodeByIP(from), t = searchNodeByIP(to);
    if (f != -1 && t != -1) {
      buffers[t] = from + "|" + msg;
      return true;
    }
    return false;
  }
//----------------------
  public void setServer(String ip) {
     int i = searchNodeByIP(ip);
     if (i != -1) server = i;
  }
//----------------------
  public String getServer() {
    (server != -1)? return nodeIPs[server]: return "No server";;
  }
}
```

Answer of Question 1:

Name:	ID:	Section Time:
Instructor Name:		

Question 2: (5 marks)

Find and **circle** the errors (**<u>do not correct the errors</u>**) in the following java class:

```
1  import java.util.Scanner;
2  public class myArray {
3        public static void main(String[] args)  {
4              Scanner read = new Scanner(System.in);
5              int  age = new int[10];
6              int  i = 0;
7              Do {
8                    System.out.print("Enter positive value of age[" + i + "]: ");
9                    age[i] = read.next( );
10                   i++;
11             } while [ i < 10 ] ;
12             Int M = 0;
13             int j, index = -1;
14             for  (j=0;  j++)  {
15                   if (age[j] > M)  {
16                         M = age( j );
```

```
                        index = j;
            }
            System.out.println("Greatest element of array age is: " + M);
            System.out.println(" and its position is: " + index);
      }
}
```

Name:	ID:	Section Time:
Instructor Name:		

Question 3: (5 marks)

Give the output of the following program if the input from the keyboard is:

30 40 10 70 15 80 90

```
public class A {
  private int a[];
  private int val;
  private int nbValues;

  public A(int c, int v){
      a = new int[c];
      val = v;
      nbValues = 0;
  }

  public void insert(int v){
    if (nbValues<a.length && v>val){
        a[nbValues] = v;
        nbValues++;
    }
  }

  public int f(){
      int r = -1;
      if (nbValues>0) r = a[nbValues/
2];
            return r;
  }

  public void display(){
    System.out.print("[");
    for (int i = 0;i<nbValues;i++)
            System.out.print(a[i]+" ");
    System.out.println("]");
  }
}
```

```
import java.util.Scanner;
public class Main1{
  public static void main(String a[]){
      Scanner s;
      A obj;
      int v;
      s = new Scanner(System.in);
      obj = new A(100,20);
      v = s.nextInt();
      while (obj.f()<50) {
  System.out.println("v="+v+"--
>"+obj.f());
        obj.insert(v);
        v = s.nextInt();
      }
      obj.display();
  }
}
```

Answer of Question 3:

Name:	ID:	Section Time:
Instructor Name:		

Question 4:

Part A: (6 Marks)

Having an AirTicket class (see the UML class diagram), we would like to manage its related information.

Airticket
-destination : string -business : boolean -actualPrice : double
+Airticket(in dest : string, in bsnss : boolean, in basicPrice : double) +getAmount() : double +getDestination() : string -calculateActualPrice(in basicPrice : double) : void +applyDiscount(in discount : double) : void

The AirTicket class has the following **attributes**:

- ***destination***: the destination of the flight (dammam, Tabouk, Jazan, etc.).
- ***business***: a boolean that indicates whether the ticket corresponds to a business class or not.
- ***actualPrice*:** the actual price of the ticket (what the customer will pay).
-

The class AirTicket provides the following **services**:

- A **constructor** accepts three par
- ameters ***dest***, ***bsnss*** and ***basicPrice***. The two first ones are stored in the appropriate attributes and the third one is used to calculate the actual price using the method ***calculateActualPrice***.

- ***getAActualPrice***: returns the actual price of the ticket.

- ***getDestination***: returns the destination.

- ***calculateActualPrice***: accepts one parameter ***basicPrice*** and calculates the air ticket's attribute ***actualPrice*** based on the type of the ticket (business or not). If the ticket is of type business there is an extra of 150 riyals.

  As an example suppose that the ticket basic price is 1300 and the ticket is a business class ticket then ***actualPrice*** = 1300+150 = 1450 riyals. If the price is 900 and the ticket is a non business class ticket then ***actualPrice*** = 900 riyals.

- ***applyDiscount***: updates the attribute ***actualPrice*** based on the discount given as parameter if it is a positive number. As an example: suppose the amount is SR 1100 and the ticket has a discount of SR 250 then the ***actualPrice*** = 800 – 250 = 550 riyals (the amount should remain always positive).

Question : **implement the class AirTicket**

Answer of Question 4 (Part A):

Name:	ID:	Section Time:
Instructor Name:		

Question 4:

Part B: (8 Marks) Write a class ***Application*** that contains a *main* method, which performs the **following <u>ordered</u> processing**:

- read the number of air tickets nbTickets from the keyboards.
- Repeat the following nbTickets times: read the air ticket's data from the keyboard, create the object, and read the discount and apply it.
- Display the average price and the destination of the ticket that has the maximum price.

Answer of Question4 (Part B):

Name:	ID:	Section Time:
Instructor Name:		

Question 5: (12 Marks)

Having a UniversityStaff class (see the UML class diagram), we would like to manage the staff information.

UniversityStaff
-staffId : int[ ] -salary : double[ ] -collegeCode : int[ ] -nbCurrentStaff : int
+UniversityStaff(in size : int) +searchIndexOfStaffMember (in sId : int) : int +addStaffMember(in sId : int, in sal : double, in collgId : int) : void +displayStaffOfSpecificCollege(in collgId : int) : void +averageSalaryInSpecificCollege(in collgId : int) : double +lessStaff(in univ : UniversityStaff) : boolean

*The UniversityStaff class has the following **attributes**:*

- **staffId** : an array that stores the identifiers of the staff working in the university
- **salary**: an array that stores the salaries of the university staff.
- **collegeCode:** an array that stores the codes of the colleges of the university.
- **nbCurrentStaff:** the number of staff of the university.

*The class University provides the following **methods**:*

- A **constructor** that accepts one parameter *size* (common size of the three arrays) used to allocate the necessary space to the three arrays. The attribute *nbCurrentStaff* is initialized to zero.

- ***searchIndexOfStaffMember*** accepts one parameters *sId*. It searches the staff member that has this sId and returns the index (place location in the array) of that member if it is found, otherwise it returns -1.

- ***addStaffMember*** accepts three parameters *sId* as the staff identifier, *sal* as the salary and *collgId* as the code of the college in which that staff member is working and stores them in their appropriate arrays.

- ***displayStaffOfSpecificCollege*** accepts one parameter *collgId* as the code of a college and displays all staff id working in that college.

- ***averageSalaryOfSpecificCollege*** accepts one parameter *collgId* as the code of a college and returns the average salary of the staff members of that college.

- ***lessStaff*** accepts one parameter *univ* returns true if the current object has more staff than the object *univ* and returns false otherwise.

Question : **Implement the class UniversityStaff**

Answer of Question 5:

Result

Question No.	Relevant Student Outcome	SO is Covered by %	Full Mark	Student Mark	Assessor's Feedback
1	a	10	4		
2	a c	2.5 10	5		
3	c	12.5	5		
4	c	35	14		
5	c	30	12		
Totals		100%	40		

I certify that the work contained within this assignment is all my own work and referenced where required. **Student Signature:** **Date:**		**Feedback Received:** **Student Signature:** **Date:**

King Saud University

College of Computer and Information Sciences
Computer Science Department

Duration	2h: 30 minutes
Course Code:	CSC 111
Course Title:	Introduction to Programming
Semester:	Spring 2015
Exercises Cover Sheet:	**Final Exam – (Version A)**

Student Name:	
Student ID:	
Student Section No.	

Tick the Relevant	Computer Science B.Sc. Program ABET Student Outcomes	Question No. Relevant Is Hyperlinked	Covering %
√	a) Apply knowledge of computing and mathematics appropriate to the discipline;	1,2,3	50%
	b) Analyze a problem, and identify and define the computing requirements appropriate to its solution		
√	c) Design, implement and evaluate a computer-based system, process, component, or program to meet desired needs;	4,5	50%
	d) Function effectively on teams to accomplish a common goal;		
	e) Understanding of professional, ethical, legal, security, and social issues and responsibilities;		
	f) Communicate effectively with a range of audiences;		
	g) Analyze the local and global impact of computing on individuals, organizations and society;		
	h) Recognition of the need for, and an ability to engage in, continuing professional development;		
	i) Use current techniques, skills, and tools necessary for computing practices.		
	j) Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices;		
	k) Apply design and development principles in the construction of software systems of varying complexity;		

Question 1 (1 mark each = 11 Marks)

Put your answer of question 1 (**multiple choice questions**) in the following table:

FORM A	
Question	Answer
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	

1. Suppose a Scanner object is created as follows:

```
Scanner input = new Scanner(System.in);
```

What method do you use to read an int value?

A. input.nextInt();
B. input.nextInteger();
C. input.int();
D. input.integer();

---

2. What is the exact output of the following code?

```
double area = 3.5;
System.out.print("area");
System.out.print(area);
```

A. 3.53.5
B. 3.5 3.5
C. area3.5
D. area 3.5

---

3. Which of the following is a valid identifier?

A. private
B. class
C. 9X
D. 8+9
E. radius

---

4. _____ is the Java assignment operator.

A. ==
B. :=
C. =
D. =:

---

5. The expression 4 + 20 / (3 - 1) * 2 is evaluated to

A. 4
B. 20
C. 24
D. 9
E. 25

---

6. Suppose x is 1. What is x after x += 2?

A. 0
B. 1
C. 2
D. 3
E. 4

---

7. Given the following method

```
public void powersOfTwo (){
        int power = 1;
        for (int count=1; count <= 3; count++) {
                power *= 2;
        }
        System.out.print (power);
}
```

What will be displayed by the call powersOfTwo() ?

A. 1
B. 8
C. 16
D. 4

---

8. Given the following method

```
public void isAlpha (char ch) {
        System.out.print ( (ch >= 'a' && ch <= 'z') || (ch >= 'A' && ch <= 'Z') );
}
```

What will be displayed by the call isAlpha('%') ?

A. false
B. true
C. FALSE
D. Nothing because there is an error

---

9. Given the following method

```
public void average (int num1, int num2, int num3){
        System.out.print ((num1+num2+num3) / 3.0);
}
```

What will be displayed by the call average(2,3,4) ?

A. 3
B. 3.0
C. 9
D. Nothing because there is an error

---

10. Given the following method

```
public void countA (String str){
        int count = 0;
        for (int index=0; index < str.length(); index++)
                if (str.charAt(index) == 'A')
                        count++;
        System.out.print(count);
}
```

What will be displayed by the call countA("I like JAVA language") ?

A. 4
B. 2
C. 12
D. 20
E. Nothing because there is an error

---

11. Given the following method

```
public void alarm (int num){
        for (int count=1; count <= num; count++)
                System.out.println ("Alarm!");
        }
```

What will be displayed by the call alarm(2) ?

A. Alarm!

B. Alarm!
Alarm!

C. Alarm!
Alarm!
Alarm!

E. Nothing because there is an error

Question 2 (10 Marks)

The following code segments may or may not have errors (logical, syntactical, or given certain input: runtime). If there are errors, **underline their positions** and **rewrite the whole code segment after correcting all errors**. Assume that all necessary imports and method headers are given before the code segment.

Purpose of code	Code segment (if there are errors, underline the errors and re-write the code without errors , if there are no errors do not write anything)
1) Declare and create an array of integers and initialize it to the first 5 positive integers.	`int x = new int[];` `x[0] = 1; x[1] = 2; x[2] = 3; x[3] = 4; x[4] = 5;`
Correction:	

2) Find the index of the second smallest element in the array a	`smallest = 0;`
	`for (int 1=i; i<a.length; i+=1)`
	`  if (a[i]<a[smallest])`
	`  smallest = a;`
	`if (smallest!=0)`
	`  second_smallest = 0;`
	`else`
	`  second_smallest = 1;`
	`for (int i=second_smallest+2; i<=a.length; i++)`
	`  if (a[i]<a[second_smallest])&&(i!=smallest)`
	`  second_smallest = i;`

Purpose of code	Code segment (if there are errors, underline the errors and re-write the code without errors , if there are no errors do not write anything)
Correction:	

3) Read form the user the number of students, their GPAs, and calculate the average GPA.	`Scanner kb = new Scanner(System.in);`
	`int n_students = kb.nextInt();`
	`int sum = 0`
	`for (int i=0; i<=n; i++)`
	`  sum += kb.nextInt();`
	`int average = -1;  // the -1 means invalid value`
	`if (true)`
	`  average =/ sum;`

Correction:	

Question 3 (4 Marks)

What is the output of the following java program?

```
class Football {
  private double price;
  private String brand;
  private String quality;

  public Football(double pr, String br) {
    price = pr;
    brand = br;
    quality = "Good";
    display()
  }

public void changePrice(double p) {
    price = p;
    if (price < 0){
      price = 0.0;
      System.out.println("cant bye a football");
    }
    else {
      quality = "Excellent";
      changeBrand();
      display();
    }
  }

  private void changeBrand() {
    if (price >= 0 && price <= 100.0)
      brand = "Local";
    else if (price > 100 && price <= 200.0)
            brand = "Unknown";
         else
            brand = "Adidas";
  }

  private void display(){
    System.out.println("Price of ball "+ price);
    System.out.println("Brand is "+ brand);
    System.out.println("Has " + quality+" quality");
  }
}

public class FootballTest {
  public static void main(String[] args) {
    System.out.println("First state :");
    Football fb = new Football(125.5," Unknown");
    System.out.println("After change :");
    fb.changePrice(500.0);
  }
}
```

Answer

Question 4 (15 Marks)

Write a Java program to manage a game store. The program allows the storeowner to add new games to inventory and to sell games. Game data is stored in two parallel arrays: `name` and `price`. Use the UML of the class below.

```
GameStore
-  name: String[]
-  price: double[]
-  numOfGames: int
-  totalSale: double
+  GameStore()
+  GameStore(inventorySize: int)
+  add(name: String, price: double): void
+  findGame(name: String): int
+  sell(name: String): void
+  getTotalSale(): double
```

TestGameStore
+ main(): void

Here is a description of each method in the class:

- `GameStore()`: this is the default constructor. It calls the other constructor and pass it the value 100 as default inventory size.
- `GameStore(inventorySize: int)`: this constructor creates the two arrays of a size based on inventorySize. It also initializes numOfGames to zero.
- `add`: this method is used to add a game to the store given its name and price. If the game is already in the store (use method `findGame` to check this) then it prints an error message "**ERROR: GAME ALREADY IN STORE**". Notice that a game is added only if there is enough space in inventory otherwise add prints an error message "**ERROR: NO ENOUGH SPACE IN INVENTORY**".
- `findGame`: this method is used to find game's data given its name (use method `equals()` to compare strings). The method returns the array index at which the game's data is stored otherwise it returns -1 indicating that the game was not found.
- `sell`: this method is used to sell a game given its name. If the game is not in the inventory then it prints an error message "**ERROR: GAME IS SOLD OUT**". If a game is sold then it must be deleted from inventory. Each time a game is sold, we add its price to `totalSale`.

Write program `TestGameStore` that does the following:

1) Starts by creating an object of type `GameStore` that can store data of up to N games (inventory size is N) where N is an integer input by user.
2) Then it adds 3 games to inventory. It reads name of the game (as a String) and its price (as a double). Use a loop to read the 3 games.
3) After that it sells two games to customers. For each game, it reads the name of the game before selling it.
4) Finally, it prints the `totalSale`.

Answer

+ Bonus Question (5 Marks) (if you don't answer this question, you lose no marks)

Write a Java method `sum` that takes an array of integers ***a*** and returns a **new array** of integers ***b*** of **same size** such that each element ***i*** in ***b*** is the result of addition (summation) of all elements ***0*** to ***i*** in ***a***.

Example: Given ***a*** = [1, 3, 2, 6, 10], method `sum` returns array ***b***=[1, 4, 6, 12, 22] since 1 = 1, 4 = 1+3, 6 = 1+3+2, 12 = 1+3+2+6, 22 = 1+3+2+6+10.

Answer:

Result					
Question No.	**Relevant Student Outcome**	**SO is Covered by %**	**Full Mark**	**Student Mark**	**Assessor's Feedback**
1	a	25	11		
2	a	25	10		
3	a	10	4		
4	c	40	15		
Bonus Question	c	15	5		
Totals		100% + 15%	40 + 5		

I certify that the work contained within this assignment is all my own work and referenced where required. **Student Signature:** **Date:**			**Feedback Received:** **Student Signature:** **Date:**	

تجميعه
CSC111

Question 1: (8 Marks)

a- Draw the UML class diagram of the following Java code:

```
public class NamesList {
   private String name[];
   private int code[];
   private int number;

   public NamesList(int z){
         name = new String[z];
         code = new int[z];
         number = 0;
   }
   public boolean AddNewRec(int ident, String mn){
         if (number<code.length){
               code[number]=ident;
               name[number] = new String(mn);
               number++;
               return true;
         }
         else
               return false;
   }
   public void display(){
         int i;
         for (i=0;i<number;i++){
               System.out.println(code[i]+" --- "+name[i]);
         }
   }
   public String display(int location){
         if (location>=0 && location<number)
               return name[location];
         else
               return "not present";
   }
   public void deleteByLastIndex(int location){
         if (location>=0 && location<number){
               code[location]= code[number-1];
               name[location]=name[number-1];
               number--;
         }
   }
   public int deleteByShiftingData(int location){
         if (location>=0 && location<number){
               for (int i= location; i<number-1; i++){
                     code[i]= code[i+1];
                     name[i]=name[i+1];
               }
               number--;
         }
         return number;
   }
}
```

Question 2: (12 Marks)

I) Answer the following with True/False:

Question	Answer (True/False)
a. The output of the following code segment is "26": `int someInt=26; System.out.println("someInt");`	
b. To declare a boolean variable b in Java we write: `boolean b;`	
c. In java, a variable x is divisible by 5 if the expression `(x%5==0)` is evaluated true.	
d. Using a *switch*-statement only (without using if), we can know whether an integer x is equal to 0 or not.	
e. Compiling a program successfully guarantees that it executes correctly.	
f. The following two lines of code do the same thing: `for(i=1;i<5;i++) z = z+i;` AND `i=1; do { z += i; i = i + 1; } while (i<5);`	
g. The following statement is valid in Java `int x=1; double y=2.0; x = x+y;`	
h. The expression `(x = 0)` is used in an *if*-statement to know whether x is equal to 0.	

II) Multiple choice: Circle only one choice in each question:

a. After executing the following code segment:

```
int result=1; for(i=1;i<=4;i++) result = result*i;
```

the variable result will contain the value:

a) 20
b) 24
c) 30
d) 10

b. Given two variables x and y of type int, where we assume that x=3, and y=4, we calculate z as follows:

```
int z=0; for(i=0;i<x;i++) z += y;
```

what will the value of z be?

a) 0
b) 3
c) 8
d) 12
e) Null

c. What will the value of v be after executing the following code segment?

Suppose that the value stored in 'a' are

5	8	3	0

```
v=a[0];
for(i=1;i<a.length;i++) {if (a[i]>v) v=a[i]};
```

a) 0
b) 8
c) 4
d) 5
e) Null

d. Given a Boolean variable w, which of the following is a valid assignment statement?

a) w = false;
b) w = w && w;
c) w = 5 > n;
d) a and c above
e) a, b, and c above

e. What is the output of the following code segment:

```
System.out.print(10/3);
```

a) 3
b) 3.3
c) 3.33333333
d) none of the above

Question 3 : (10 Marks)

Implement in Java the following `CourseSection` class diagram:

CourseSection
- courseName : String - nameOfStudent : String[] - studentID : integer[] - GPA : double[] - nbStudents : integer
+ CourseSection(capacity : integer, cName: String) + addNewStudent(stName:String, stID:integer, stGPA:double):boolean + getStudentIndex(stId : integer) : integer + getnbStudents() : integer + deleteStudent(stId : integer) : boolean + displayStudentAtIndex(k : integer) : void + displayPassOrFailStudents (indicator : String) : void

Attributes :

- nameOfStudent : Array that stores names of students registered in the section.
- studentID : Array that stores IDs of students registered in the section.
- GPA : Array that stores gpa of each student registered in the section.
- nbStudents : Number of students registered in the section currently.
- courseName : Name of the course (e.g. Programming 1)

Methods :

a) `CourseSection(capacity : integer, cName: String)`: A constructor method which creates arrays with the given capacity (the maximum number of students that a section can have) and assigns cName to courseName and initializes the attributes nbStudents to zero.

b) `addNewStudent(stName:String, stID:integer, stGPA:double)` : Adds a new student in the section with the studentName as stName, studentID as stId and GPA as stGPA. This method returns true if the student is added successfully otherwise it returns false.

c) `getStudentIndex(stId : integer)`: returns index of the student whose ID is stId otherwise -1.

d) `getnbStudents()`: returns total number of student currently registered in the section.

e) `deleteStudent(stId : integer)`: deletes a student whose ID is stId. This method returns true on successful deletion otherwise it returns false.

f) `displayStudentAtIndex(k : integer)`: Shows data of the student whose is stored at position k.

g) `displayPassOrFailStudents(indicator : String) : void`: Shows information of all the students in the section whose indicator is according to the following table:

indicator	GPA
Pass	>=2.5
Fail	<2.5

If the indicator is equal to Pass then the method would display ONLY the students who passed. If the indicator is equal to Fail then the method would display ONLY the students who failed.

Question 4 : (10 Marks)

Using class `CourseSection`, write a Java class `CourseSection`, which contains a main program that performs following operations:

a) Create CourseSection object with capacity of 45 student and course name "Programming 1".
b) Add following students in the section.

Student Name	ID	GPA
Ali	42910011	2.6
Fahad	43121476	2.1
Majid	43395138	3.5

c) (we suppose that we inserted several students) Delete student whose ID is 43395138 from the section.
d) Display information about the student whose ID is 43122345.
e) Display all information about all students.
f) Display all information about all students whose grade is "Pass".

1) What will be the output of following statements?

```
int x = 3;
int y = x++ * 4;
System.out.print(y);
```

a) 25
b) 24
c) 12
d) 33

2) What is the output of the following program:

```
boolean var1 = false;
boolean var2 = true;
     if (var1)
          System.out.println(var1);
     else
          System.out.println(var2);
```

a) 0
b) 1
c) true
d) false

3) What will be the output of the program if `i = 1` and `j = 10`, `x = 3`?

```
do {
if(i++ > --j)
     x++;
} while (i < 5);
System.out.println("i = " + i + " and j = " + j);
```

a) `i = 6` and `j = 5`
b) `i = 5` and `j = 5`
c) `i = 6` and `j = 6`
d) `i = 5` and `j = 6`

4) Suppose you have the following code segment:

```
x = 1.0;
integerVariable = x + 10;
```

Which of the following statements is true?

a) `integerVariable` is of type `int`.
b) `x` is of type `int`.
c) `integerVariable` is of type double.
d) a && b.

5) What is the output of the following code segment, if any:

```
int x = 1;
while(x % 6 != 5)
x++;
System.out.println(x);
```

a) 1
b) 5
c) 6
d) Infinite loop.

6) What is the output of the following code segment, if any:

```
double x = 7.8;
double y = (int)x;
System.out.println("x = " + x + ", y = " + y);
```

a) `x = 7.8, y = 7.0`
b) `x = 7.8, y = 7.0`
c) `x = 7.0, y = 7.0`
d) `x = 7.0, y = 7.8`

7) Given `x = 8`, `y = 0`, `z = 1`, what will be displayed by the following statement?

```
if (x > 0 && y < 0)
System.out.println("Yes");
else if (z > 0)
System.out.println("No");
```

a) Yes
b) Yes
   No
c) No
d) Nothing

8) What will be the output of the following code?

```
int sum = 0;
int i=0, j=0;
while (i < 7 && j < 6){
      sum += i;
      ++i; j = i + 1;
}
System.out.println(sum);
```

a) 5
b) 6
c) 10
d) compilation error

9) How many times this while loop will execute?

```
int x = 2;
int y = 0;
while (x>0 && y<20) {
      if (y % x != 0){
            System.out.println("even");
            y++;
      }
      else{
            System.out.print("odd");
            y++;
      }
}
```

a) 20 times
b) 2 times
c) 0 times
d) Infinite times

10) What is x after the following switch statement is executed?

```
int var1 = 3;
int x = 4;
switch (var1++) {
default:
     x = 1;
case 9:
     x = 2;
case 7:
     x = 3;
}
System.out.println(x);
```

a) 1
b) 2
c) 3
d) 4

11) What is the value of `i` when `System.out.print(i)` is executed?

```
int sum = 0;
int i = 0;
while (i < 5){
sum = sum + i;
i++;
}
System.out.print(i);
System.out.print(" ");
System.out.print(sum);
```

a) 6
b) 5
c) 4
d) 3

12) What is the output of this code, if any?

```
int number = 3;
do {
     if ((number % 2) != 0)
          System.out.print(number + ",");
     number -= 1;
}while (number <= 3);
```

a) 3,4,5,
b) 3,4
c) Infinite Loop
d) 3

Question 2. (4 Marks)

a) What will be the output of the following program if user enters 678 as an input?

```
import java.util.Scanner;
public class Temp {
    public static void main(String[] args) {
        int varX;
        int var1, var2, var3;
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter 3 digit-integer number: ");
        varX = sc.nextInt();

        var1 = varX / 100;
        var2 = (varX / 10) % 10;
        var3 = varX % 10;

        System.out.println(var1 + " " + var2 + " " + var3);
        System.out.println(var2 + " " + var3);
        System.out.println(var3);
    }
}
```

ANSWER:

b) Which two of the following three `if` statements are equivalent?

```
1. if (a == b)
        if (c == d)
            a = 1;
        else b = 1;
2. if (a == b) {
        if (c == d)
            a = 1; }
        else b = 1;
3. if (a == b)
        if (c == d) a = 1;
    else b = 1;
```

ANSWER:

1) Which `for` loop is equivalent to the following `while` loop

```
x=1;
while(x<10){
  System.out.println(x+"    ");
  ++x;
}
```

a) `for(x=1;x<10;x++){System.out.println(x+"    ");  }`

b) `for(x=0;x<=10;x++){System.out.println(x+"    ");  }`

c) `for(x=1;x<=10;++x){System.out.println(x+"    ");  }`

d) `for(x=0;x<=10;++x){System.out.println(x+"    ");  }`

2) What values of `j` and `k` will make this program print hello?

```
int j = -----------;
int k = -----------;
for (int i = j; i < k; i++)    {
     j++;
     System.out.println("hello");
}
```

a) `j = 5, k = 4`

b) `j = 1, k = 2`

c) `j = 3, k = 2`

d) `j = 9, k = 5`

3) How many times will the following code print "Be careful"?

```
int count = 10;
while (count-- >= 10) {
System.out.println("Be carefull");
count+=1;
}
```

a) 8

b) 9

c) 10

d) infinite loop

4) Which of the following is not nested loop?

a)
```
for(i=0;i<10;i++)
   for(j=1;j<i+2;j++)
```

b)
```
for(i=0;i<10;i++)
  System.out.println(i);
for(j=1;j<i+2;j++) System.out.println("j="+j);
```

c)
```
for(i=0;i<10;i++)
   while(j%2!=0){ System.out.println(j+" "+(++j));}
```

d)
```
for (i=0; i<10,i++){
System.out.println(i)
for(j=1;j<i+2;j++) System.out.println("j="+j); }
```

5) Which of the pattern is produced by the following code?

```
int i, j, k;
for (i = 1; i <= 7; i++) {
     for (j = 1; j <= i; ++j)
          System.out.print(j);
     for (k = 7 - i; k >= 1; k--)
          System.out.print("*");
     System.out.println("");
}
```

a)	b)	c)	d)
******1	1234567	1******	7654321
*****21	123456*	12*****	*654321
****321	12345**	123****	**54321
***4321	1234***	1234***	***4321
**54321	123****	12345**	****321
*654321	12*****	123456*	*****21
7654321	1******	1234567	******1

6) Given following class:

```
public class While {
   public void loop(){
       int x= 0;
       while ( 1 ){       /* Line 6 */
          System.out.print("x plus one is " + (x + 1)); //Line 8 */
        }
    }
}
```

Which statement is true?

a) There is a syntax error on line 1.

b) There are syntax errors on lines 1 and 6.

c) There is a syntax error on line 6.

d) There are syntax errors on lines 1, 6, and 8.

7) Consider the following code segment:

```
public class MyClass{
public MyClass(){/*code*/} // more code...
}
```

To create an object of type MyClass, you would write:

a) `MyClass mc = new MyClass();`

b) `MyClass mc = MyClass();`

c) `MyClass mc = new MyClass;`

d) It can't be done. The constructor of MyClass should be defined as:

```
public void MyClass(){/*code*/}
```

8)

```
int x = 1, y = 6;
while (y--){
    x++;
}
System.out.println("x = " + x +" y = " + y);
```

Which statement is true?

a) x = 6 y = 0

b) x = 7 y = 0

c) x = 6 y = -1

d) Compilation fails.

9) This code will not compile. What is wrong with it?

```
int a = 0, b = 0;
    for (int i = 0; i < 5; i++) {
        if (++a > 2 || ++b > 2) {
            a++;
        }
    }
    System.out.println("a=" + a + " b=" + b);
    System.out.println("Value of i after completion of loop:
" + i);
```

a) loop counter `i` is not initialized

b) loop counter `i` should be declared before the loop

c) loop counter `i` is initialized to zero

d) loop counter `i` is not updated inside the loop

10) Suppose you have the following class:

```
public class Point {
int x, y;
public Point(int x, int y) { this.x = x; this.y = y; }
public Point() { this(10, 20); }
public int getX() { return this.x; }
public int getY() { return this.y; }}
What is the output of the following code, if any:
public class PointTest {
    public static void main(String args[]) {
        Point p = new Point();
        System.out.println(p.getX());}}
```

a) 0

b) 10

c) 20

d) There is a compilation error.

Question 2. (5 Marks)

A) What is the output of the following program? (2 marks)

```
public class MyClass {
     private int a = 5;
     public void setA(int param){
          a = param;
     }
     public int getA(){
          return a;
     }
     public MyClass m1(){
          MyClass o = new MyClass();
          o.a = a + 2;
          return o;
     }
     public void m2(MyClass oParam){
          oParam.a = a + 1;
     }
     public void m3(MyClass oParam){
          oParam = new MyClass();
          oParam.a = a;
     }
}
     public static void main(String[] args){
          MyClass o1 = new MyClass();
          o1.setA(10);
          MyClass o2 = o1.m1();
          MyClass o3 = new MyClass();
          o2.m3(o3);
          MyClass o4 = new MyClass();
          o1.m2(o4);
          System.out.println("o1.a = " + o1.getA() + ", o2.a = " +
o2.getA() + ", o3.a = " + o3.getA() + ", o4.a = " + o4.getA());
     }
}
```

B) Suppose you have the following class: (3 marks)

```
class Q2 {
private int a;
private int b;
public Q2() { a = 3; b = 5;}
public Q2(int a, int b) { this.a = a; this.b = b;}
public void setA(int a){this.a = a;}
public void setB(int b){this.b = b;}
public int getA(){return a;}
public int getB(){return b;}

public boolean m(int a, int B){
     b = ++B*10;
     this.a = a*3%15;
     return b > a;
}
}
```

What is the output of main method in class TestQ2:

```
public class TestQ2 {
     public static void main(String args[]){

          Q2 obj1 = new Q2(5,10);
          Q2 obj2 = new Q2();

          System.out.println("obj1.a = " + obj1.getA());
          System.out.println("obj2.b = " + obj2.getB());

          obj2.setA(2); obj2.setB(15);

          System.out.println("obj2.a = " + obj2.getA());
          System.out.println("obj2.b = " + obj2.getB());

          for(int i = 1; i <= 3  ; i++)
          {
               if(i % 3 == 0 && obj1.m(20, i))
                    obj1 = obj2;

               System.out.println("obj2.a = " + obj2.getA());
               System.out.println("obj1.b = " + obj1.getB());
          }}}
```

Exercise 4

Convert the following switch statement into if-else statements then into if-then statements:

```
String dayString1, dayString2, dayString3;
int day = KB.nextInt();
switch (day) {
  case 1: dayString1 = "Saturday";
  case 2: dayString2 = "Sunday";
          break;
  case 3: dayString3 = "Monday";
          break;
  case 4: dayString1 = "Tuesday";
  case 5: dayString2 = "Wednesday";
          break;
  default: dayString3 = "Invalid day";
           break;
}
```

What is the type of Error ?

A.

```
01 class TestPoint {
02   public static void main(String[] args) {
03     Point p=null;
04     System.out.println(p.count);
05     System.out.println(p.x);
06   }
07 }
```

error (Compile / Run Time)

B.

```
01 class TestPoint {
02   public static void main(String[] args) {
03     System.out.println(Point.count);
04     System.out.println(Point.x);
05   }
06 }
```

error (Compile / Run Time)

C.

```
01 class TestPoint {
02   public static void main(String[] args) {
03     Point p;
04     for (int i=1; i <= 5; i++) {
05       p = new Point ();
06       p.x = i;  p.y = 2*i*i+2;
07     }
08     System.out.println(p.x);
09   }
10 }
```

error (Compile / Run Time)

Exercise 5

Write a program that reads a character then displays the following pattern using the input character

```
      A
     A A
    A A A
   A A A A
  A A A A A
 A A A A A A
```

Exercise 1:

```
public static int max(int num1, int num2) {
    int result = 0;
    if (num1 > num2)
      result = num1;
    else
      result = num2;
    return result;
```

E. What is the output of the following program?

```
class Magic {
  int i;
  double j;
}
public class TestMagic {
  public static void main(String[] args) {
    Magic m = new Magic();
    m.i = 11;
    m.j = 5.5;
    Magic m2 = new Magic();
    m2 = m;
    m2.i = m2.i + 2;
    m2.j = 1 + m2.i / ((m.i - 9) / 2);
    System.out.println(m.i + ", " + m.j + ", " + m2.i + ", " +
m2.j);
  }
}
```

D. Write a code snippet that uses an array initializer to create an array of characters r that contains the characters of the word "Riyadh".

E. What is wrong with the following code? Is it a compile-time error or a runtime error?

```
int[] a = new int[-1];
```

F. What is wrong with the following code? Is it a compile-time error or a runtime error?

```
int[] a;
a[2] = 10;
```