**SECTION A [35 MARKS]**

**Use only the grid, provided at the end of the question paper, to answer SECTION A.**

**QUESTION ONE [15 MARKS]**

**True/False:** *Indicate whether the sentence or statement is true or false***.** *CROSS (X) THE CORRECT ANSWER only on the answer grid.*

*.*

1.1 Suppose x = 15.7. The output of the statement -- System.out.println((int)(x) / 2); is 7.

1.2 Suppose x = 18.9. The output of the statement -- System.out.println((int(x) % 3); is 1.

1.3 If a = 4; and b = 3; then after the statement a = b; executes the value of b is erased.

1.4 Suppose a = 5. After the execution of the statement ++a; the value of a is 6.

1.5 Consider the following the statements.

String str1 = "cat";

String str2 = "cats";

Determine whether the statement

str1.equals(str2);

is true or false.

1.6 Determine whether the expression

6 < 5 || 'g' > 'a' && 7 < 4

is true or false.

1.7 The loop condition is reevaluated after every iteration of the loop.

1.8 The output of the Java code (Assume all variables are properly declared.)

n = 0;

while (n < 5)

{

System.out.print(n + " ");

n++;

}

System.out.println();

is: 0 1 2 3 4 5

1.9 The output of the following Java code (Assume all variables are properly declared and the input is 4 3 2 6 –1).

sum = 0;

num = console.nextInt();

while (num != -1)

{

num = console.nextInt();

sum = sum + num;

}

System.out.println(sum);

is: 10

1.10 The following for loop executes 20 times. (Assume all variables are properly declared.)

for (i = 0; i <= 20; i++)

System.out.println(i);

1.11 After a break statement executes, the program continues to execute with the first statement after the structure.

1.12 To use a predefined method you must know the code in the body of the method.

1.13 The instance variable length is a public member and can be directly accessed using the dot operator.

1.14 When you pass an array as a parameter, the base address of the actual array is passed to the formal parameter.

1.15 Two arrays are parallel if they hold the same type of data.

**QUESTION TWO [20 MARKS]**

**MULTIPLE CHOICE**

*Identify the letter of the choice that best completes the statement or answers the question.*

**Answer this question on the answer grid provided. CROSS (X) THE CORRECT ANSWER.**

2.1 The length of the string "computer science" is \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 14 | c. | 16 |
| b. | 15 | d. | 18 |

2.2 Suppose that x and y are int variables and x = 10 and y = 20. After the statement: x = x + y; executes, the value of x is \_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 10 | c. | 30 |
| b. | 20 | d. | None of these |

2.3 Consider the following statements.

String str;

int num1, num2;

num1 = 13;

num2 = 24;

str = "The sum = " + num1 + num2;

What is the final value stored in str?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | The sum = 37 | c. | The sum = 13 + 24 |
| b. | The sum = 13 24 | d. | The sum = 1324 |

2.4 What is the output of the following statements?

if (5 > 4 + 3)

System.out.println("Hello");

System.out.println("World");

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Hello | c. | World |
| b. | Hello World | d. | There is no output. |

2.5 Suppose x and y are int variables. Consider the following statements.

if (x > 5)

y = 1;

else if (x < 5)

{

if (x < 3)

y = 2;

else

y = 3;

}

else

y = 4;

What is the value y if x = 3?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 1 | c. | 3 |
| b. | 2 | d. | 4 |

2.6 What is the output of the following code?

char lastInitial = 'S';

switch (lastInitial)

{

case 'A': System.out.println("section 1");

break;

case 'B': System.out.println("section 2");

break;

case 'C': System.out.println("section 3");

break;

case 'D': System.out.println("section 4");

break;

default: System.out.println("section 5");

}

|  |  |  |  |
| --- | --- | --- | --- |
| a. | section 2 | c. | section 4 |
| b. | section 3 | d. | section 5 |

2.7 What is the value of counter after the following statements executes?

counter = 0;

while (counter <= 50)

counter = counter + 1;

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 48 | c. | 51 |
| b. | 50 | d. | 53 |

2.8 Suppose sum and num are int variables, and the input is

18 25 61 6 -1

What is the output of the following code? (Assume that console is a Scanner object initialized to the standard input device.)

sum = 0;

num = console.nextInt();

while (num != -1)

{

sum = sum + num;

num = console.nextInt();

}

System.out.println(sum);

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 92 | c. | 110 |
| b. | 109 | d. | None of these |

2.9 What is the next Fibonacci number in the following sequence?

1, 1, 2, 3, 5, 8, 13, 21, ...

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 34 | c. | 56 |
| b. | 43 | d. | 273 |

2.10 Consider the following for loop.

for (i = 1; i < 20; i++)

System.out.println("Hello World");

System.out.println("!");

How many times will Hello World be printed by this for loop?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 1 | c. | 19 |
| b. | 18 | d. | 20 |

2.11 What is the output of the following Java code?

int x = 1;

int j;

for (j = 0; j <= 2; j++)

x = x \* j;

System.out.println(x);

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 0 | c. | 2 |
| b. | 1 | d. | None of these |

2.12 Suppose that the input is

4 7 –8 5 2

What is the value of following Java code? (Assume that console is a Scanner object initialized to the standard input device.)

int sum = 0;

int num;

int j;

for (j = 1; j <= 5; j++)

{

num = console.nextInt();

if (num < 0)

break;

sum = sum + num;

}

System.out.println(sum);

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 3 | c. | 11 |
| b. | 10 | d. | None of these |

2.13 Consider the following code.

int x = 5;

int y = 30;

do

x = x \* 2;

while (x < y);

How many times does the statement x = x \* 2; execute?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 0 | c. | 2 |
| b. | 1 | d. | 3 |

2.14 What is the value of x after the following statements execute?

int x = 5;

int y = 30;

do

x = x \* 2;

while (x < y);

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 5 | c. | 20 |
| b. | 10 | d. | 40 |

2.15 Consider the following statements.

int x = 5;

int y = 30;

do

x = x \* 2;

while (x < y);

If y = 0, how many times would the do...while loop execute?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 0 | c. | 2 |
| b. | 1 | d. | 3 |

2.16 Assume that two 1-D arrays are parallel. Assume the first array contains a person’s id number and the second array contains his or her age. In which cell of the second array would you find the age of the person, whose id number is in the third cell of the first array?

|  |  |
| --- | --- |
| a. | first |
| b. | second |
| c. | third |
| d. | It cannot be determined from the information given. |

double[][] vals = {{1.1, 1.3, 1.5},

{3.1, 3.3, 3.5},

{5.1, 5.3, 5.5},

{7.1, 7.3, 7.5}}

2.17 What is the value of vals.length in the array above?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 0 | c. | 4 |
| b. | 3 | d. | 16 |

2.18 What is in vals[2][1]?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 1.3 | c. | 3.5 |
| b. | 3.3 | d. | 5.3 |

2.19 How many columns are in the array above?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 0 | c. | 3 |
| b. | 2 | d. | 4 |

2.20 What is the value of vals[4][1] in the array above?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 7.1 | c. | 7.3 |
| b. | 1.1 | d. | There is no such value. |

**SECTION B [65 MARKS]**

**Write COMPLETE Java Programs for all questions in SECTION B in your answer booklet.**

**QUESTION THREE [7 Marks]**

Write an application that determines whether a word entered by the user is a palindrome. A palindrome is a word that reads the same backward and forward. Assume that the input is always in the same case. For example, mom read backwards is still mom, so mom is a palindrome, whereas dog read backwards is god, so dog is not a palindrome. Display an appropriate message showing the word that was input, and whether or not it is a palindrome.

**Note: You may write the entire palindrome solution using just the main method.**

**QUESTION FOUR [30 Marks]**

Write a program that will allow the Miss South Africa beauty pageant organisers to store the names and scores of all contestants taking part in the 2016 finals of the Miss South Africa competition, which takes place annually in Sun City.

There are 12 contestants taking part in the finals this year. They will be judged by three celebrity judges. Your program will assist in determining the total and average score for each contestant, as well as the winner of the Miss SA title.

Create the following methods for the program:

**Note:** All arrays must be declared locally within the main method and passed to other methods that require them for processing.

4.1 Create a class called Pageant. (1)

4.2 Declare a 1-D array called **contestants** that will store the names of all 12 contestants. Write a method called **inputContestants** where the user will be prompted to enter the names of the contestants via keyboard. (2)

4.3 Declare a 2-D array called **scores** to store for each of the 12 beauty contestants, the 3 scores from the judges. Also, create another 1-D array called **average** that will later be used to store the average score for each contestant. (2)

4.4 Write a method called **inputScores** to enter via the keyboard the scores from the 3 judges for all the contestants. The prompt should display the name of the contestant and score number that needs to be entered. (4)

4.5 Write a method called **calculateAverage** to determine the average of the 3 scores received by a contestant. Store the average score for each contestant in the **average** array. (4)

4.6 Write a method called **findHighestAverage** that will find the highest average from the average array. The winner is determined by the highest average. Display the name of the beauty contestant who wins the Miss SA title and her average score. (5)

4.7 Write a method called **displayResults** to display the Miss SA beauty pageant results. The data must be displayed in a tabular format, as shown using the sample data below. (5)

Contestant Score 1 Score 2 Score 3 Average

Annelisa 8 7 6 7

Lerato 6 5 6 5.67

Katlego 9 8 9 8.67

Hayley 7 10 7 8

….

4.8 Write a method called **findResults** to input the name of a beauty contestant from the keyboard. Find and output the average score for this contestant. Note, if the name of the contestant is not found, then output the message: Contestant was not found. (4)

4.9 Write the main method to call up the methods. (3)

**QUESTION FIVE [28 Marks]**

**You have been approached by a local bookstore to develop a Book Inventory application to assist them to keep track of the various books that their inventory consists of.**

5.1 Create a Book class that can hold the following information about a book: title, author, price and number of copies. (3)

5.2 Create mutator methods for all class attributes. (4)

5.3 Create accessor methods for all class attributes. (4)

5.4 Create a default constructor that automatically sets the title and author attributes to null strings i.e. “ ”, price and number of copies to 0. (2)

5.5 Create an additional overloaded constructor for the book class that will receive parameters for each of the attributes and assigns them appropriately. (3)

5.6 Create a **toString** method for the Book class to concaternate and return all attribute values with appropriate labels. Each value will be displayed on a new line. (2)

5.7 Write a method named **updateCopies** that will receive a parameter indicating the number of new copies of a book purchased. Increase the existing number of copies by the number of new copies purchased by the store. (2)

5.8 Annually, the price of books is increased by 10%. Write a method called **increasePrice** that will update the existing price of a book by an additional 10%. (2)

5.9 Create an application to test the Book class. (6)

Create an object of the Book class called fiction. The attributes of the fiction object will automatically be set to the default constructor values.

Prompt the user for values for each attribute for a second object called nonfiction.

Create the object nonfiction using the values provided by the user.

Display the values for both objects using the toString method.