1. **(10 Points)** true or false?

a. Given the following variable definitions:
 	
int numPeople = 10, numCars = 2;
char userKey = 'q';
boolean found = false;
 	
The logical expression:
 	
((numPeople >= 10) && (numCars < 4) && (found)) || (userKey == 'q');
	Evaluates To
	
	true
	
	or
	
	false

b. Given the following variable definitions: String str1 = "Apples", str2 = "apples"; The following expression: str1.equals(str2);	**Evaluates To** true or **false**
c. Given the following variable definition: String userString = "I Love Java!!!" The following expression: Character.isLetter(userString.charAt(3));	**Evaluates To** **true** or false

d. Given:
 	
for (int i = 0 ; i < 5 ; i++) {
 if (i < 10) {
  continue;
 }
 System.out.println("i = " + i);
}
 	
The loop will print some output.
	true
	
	or
	
	false

e. Given the following array definition:
 	
int[] arr = new int[10];
 	
The following loop will encounter a problem:
 	
for (int i = 0 ; i <= arr.length ; i++) {
 arr[i] += 1;
}
	true
	
	or
	
	false

2. (20 Points) Given `numRows` and `numColumns`, print a list of seats in a theater. Rows are numbered and columns are lettered.

For example, a theater with 3 rows and 4 columns should appear as follows:

```
1A  1B  1C  1D
2A  2B  2C  2C
3A  3B  3C  3D
```

```java
public class TheaterSeats {

    public static void main(String[] args) {
        int numRows = 9;
        int numColumns = 15;

        for ( int i = 1 ; i <= numRows ; i++ ) {
            char seat = 'A';
            for ( int j = 1 ; j <= numColumns ; j++ ) {
                System.out.print(i + "" + seat + " ");
                seat++;
            }
            System.out.println();
        }
    }
}
```

Output from this solution:

```
1A  1B  1C  1D  1E  1F  1G  1H  1I  1J  1K  1L  1M  1N  1O
2A  2B  2C  2D  2E  2F  2G  2H  2I  2J  2K  2L  2M  2N  2O
3A  3B  3C  3D  3E  3F  3G  3H  3I  3J  3K  3L  3M  3N  3O
4A  4B  4C  4D  4E  4F  4G  4H  4I  4J  4K  4L  4M  4N  4O
5A  5B  5C  5D  5E  5F  5G  5H  5I  5J  5K  5L  5M  5N  5O
6A  6B  6C  6D  6E  6F  6G  6H  6I  6J  6K  6L  6M  6N  6O
7A  7B  7C  7D  7E  7F  7G  7H  7I  7J  7K  7L  7M  7N  7O
8A  8B  8C  8D  8E  8F  8G  8H  8I  8J  8K  8L  8M  8N  8O
9A  9B  9C  9D  9E  9F  9G  9H  9I  9J  9K  9L  9M  9N  9O
```

3. (30 Points) What is the output of the following program?

```java
public class Switch1 {

    public static void main(String[] args) {
        for (int i = 5; i >= 0; i--) {
            switch (i) {
            case 0:
                System.out.println(i + ":" + i);
            case 1:
                System.out.println(i + ":" + i * 2);
                break;
            case 2:
                System.out.println(i + ":" + i * 3);
            case 3:
                System.out.println(i + ":" + i * 4);
                break;
            case 4:
                System.out.println(i + ":" + i * 5);
            default:
                System.out.println(i + ":" + i * 8);
                break;
            }
        }
    }
}
```

Output:

```
5:40
4:20
4:32
3:12
2:6
2:8
1:2
0:0
0:0
```

4. (30 Points) What is the output of the following program?

```java
public class BreakContinue1 {

    public static void main(String[] args) {
        for (int i = 0; i <= 6; i += 2) {
            for (int j = 0; j <= 6; j += 2) {
                if (i == j) {
                    break;
                } else if (i < j) {
                    continue;
                }
                System.out.println("i = " + i + " : " + "j = " + j);
            }
        }
    }
}
```

Output:

```
i = 2 : j = 0
i = 4 : j = 0
i = 4 : j = 2
i = 6 : j = 0
i = 6 : j = 2
i = 6 : j = 4
```

5. (30 Points) Write a complete Java program to read a list of exam grades given as int's in the range of 0 to 100 into an array. You can assume that the maximum number of grades is 100. Use a negative number as a sentinel value to indicate the end of the input. (The negative value is used only to end the loop, do not use it in your calculations.)

```java
import java.util.Scanner;

public class GradesArray {

    public static void main(String[] args) {
        int arr[] = new int[100];
        Scanner scnr = new Scanner(System.in);
        int numGrades = 0;
        int sumVal = 0;

        for (int i = 0; i < arr.length; i++) {
            System.out.println("Enter a grade : ");
            arr[i] = scnr.nextInt();

            if (arr[i] < 0) {
                break;
            } else {
                sumVal = sumVal + arr[i];
                numGrades++;
            }
        }
        double avg = sumVal / numGrades;

        int lessThanAvg = 0;
        int greaterThanAvg = 0;

        for (int i = 0; i < numGrades; i++) {
            if (arr[i] >= avg) {
                greaterThanAvg++;
            } else {
                lessThanAvg++;
            }
        }

        System.out.println("Average Grade = " + avg);
        System.out.println("Number of grades = " + numGrades);
        System.out.println("Number of grades >= average = " + greaterThanAvg);
        System.out.println("Number of grades < average = " + lessThanAvg);
    }
}
```

1. (10 Points) true or false?

a. Given the following variable definitions:
 	
int numPeople = 10, numCars = 2;
char userKey = 'q';
boolean found = false;
 	
The logical expression:
 	
((numPeople <= 10) || (numCars > 4) || (!found)) && (userKey == 'q');
	Evaluates To
	
	true
	
	or
	
	false

b. Given the following variable definitions: String str1 = "Apples", str2 = "apples"; The following expression: !str1.equals(str2);	**Evaluates To** **true** or false
c. Given the following variable definition: String userString = "I Love Java!!!" The following expression: !Character.isLetter(userString.charAt(4));	**Evaluates To** true or **false**

d. Given:
 	
for (int i = 0 ; i < 5 ; i++) {
  if (i > 3) {
    continue;
  }
  System.out.println("i = " + i);
}
 	
The loop will print some output.
	true
	
	or
	
	false

e. Given the following array definition:
 	
int[] arr = new int[10];
 	
The following loop will encounter a problem:
 	
for (int i = 0 ; i < arr.length ; i++) {
  arr[i] += 1;
}
	true
	
	or
	
	false

2. (20 Points) Given `numRows and numColumns`, print a list of seats in a theater. Rows are lettered and columns are numbered.

For example, a theater with 3 rows and 4 columns should appear as follows:

```
A1 A2 A3 A4
B1 B2 B3 B4
C1 C2 C3 C4
```

```java
public class TheaterSeats {

    public static void main(String[] args) {
        int numRows = 9;
        int numColumns = 15;

        char row = 'A';
        for ( int i = 1 ; i <= numRows ; i++ ) {
            for ( int j = 1 ; j <= numColumns ; j++ ) {
                System.out.print(row + "" + j + " ");
            }
            row++;
            System.out.println();
        }
    }
}
```

Output from this solution:

```
A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12 A13 A14 A15
B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12 B13 B14 B15
C1 C2 C3 C4 C5 C6 C7 C8 C9 C10 C11 C12 C13 C14 C15
D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 D12 D13 D14 D15
E1 E2 E3 E4 E5 E6 E7 E8 E9 E10 E11 E12 E13 E14 E15
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 F13 F14 F15
G1 G2 G3 G4 G5 G6 G7 G8 G9 G10 G11 G12 G13 G14 G15
H1 H2 H3 H4 H5 H6 H7 H8 H9 H10 H11 H12 H13 H14 H15
I1 I2 I3 I4 I5 I6 I7 I8 I9 I10 I11 I12 I13 I14 I15
```

3. (30 Points) What is the output of the following program?

```java
public class Switch2 {

    public static void main(String[] args) {
        for (int i = 5; i >= 0; i--) {
            switch (i) {
            case 0:
                System.out.println(i + ":" + i);
                break;
            case 1:
                System.out.println(i + ":" + i * 5);
            case 2:
                System.out.println(i + ":" + i * 3);
                break;
            case 3:
                System.out.println(i + ":" + i * 9);
            case 4:
                System.out.println(i + ":" + i * 7);
            default:
                System.out.println(i + ":" + i * 8);
                break;
            }
        }
    }
}
```

Output:

```
5:40
4:28
4:32
3:27
3:21
3:24
2:6
1:5
1:3
0:0
```

4. (30 Points) What is the output of the following program?

```java
public class BreakContinue2 {

    public static void main(String[] args) {
        for (int i = 0; i <= 9; i += 3) {
            for (int j = 0; j <= 9; j += 3) {
                if (i == j) {
                    break;
                } else if (i < j) {
                    continue;
                }
                System.out.println("i = " + i + " : " + "j = " + j);
            }
        }
    }
}
```

Output:

```
i = 3 : j = 0
i = 6 : j = 0
i = 6 : j = 3
i = 9 : j = 0
i = 9 : j = 3
i = 9 : j = 6
```

5. (30 Points) Write a complete Java program to read a list of exam grades given as int's in the range of 0 to 100 into an array. You can assume that the maximum number of grades is 100. Use a negative number as a sentinel value to indicate the end of the input. (The negative value is used only to end the loop, do not use it in your calculations.)

```java
import java.util.Scanner;

public class GradesArray {

   public static void main(String[] args) {
      int arr[] = new int[100];
      Scanner scnr = new Scanner(System.in);
      int numGrades = 0;
      int sumVal = 0;

      for (int i = 0; i < arr.length; i++) {
         System.out.println("Enter a grade : ");
         arr[i] = scnr.nextInt();

         if (arr[i] < 0) {
            break;
         } else {
            sumVal = sumVal + arr[i];
            numGrades++;
         }
      }
      double avg = sumVal / numGrades;

      int lessThanAvg = 0;
      int greaterThanAvg = 0;

      for (int i = 0; i < numGrades; i++) {
         if (arr[i] >= avg) {
            greaterThanAvg++;
         } else {
            lessThanAvg++;
         }
      }

      System.out.println("Average Grade = " + avg);
      System.out.println("Number of grades = " + numGrades);
      System.out.println("Number of grades >= average = " + greaterThanAvg);
      System.out.println("Number of grades < average = " + lessThanAvg);
   }
}
```

1. (10 Points) true or false?

a. Given the following variable definitions:
 	
int numPeople = 10, numCars = 2;
char userKey = 'q';
boolean found = false;
 	
The logical expression:
 	
(numPeople == 12) || (numCars == 3) || (!found) || (userKey != 'q');
	Evaluates To
	
	true
	
	or
	
	false

b. Given the following variable definitions: String str1 = "Apples", str2 = "apples"; The following expression: str1.equalsIgnoreCase(str2);	**Evaluates To** **true** or **false**
c. Given the following variable definition: String userString = "I Love Java!!!" The following expression: Character.isWhiteSpace(userString.charAt(6));	**Evaluates To** **true** or **false**

d. Given:
 	
for (int i = 0 ; i < 5 ; i++) {
  if (i > 0) {
    continue;
  }
  System.out.println("i = " + i);
}
 	
The loop will print some output.
	true
	
	or
	
	false

e. Given the following array definition:
 	
int[] arr = new int[10];
 	
The following loop will encounter a problem:
 	
for (int i = 0 ; i <= arr.length ; i++) {
  arr[i] += 1;
}
	true
	
	or
	
	false

2. (20 Points) Given `numRows and numColumns`, print a list of seats in a theater. Rows are numbered and columns are lettered.

For example, a theater with 3 rows and 4 columns should appear as follows:

```
1A  1B  1C  1D
2A  2B  2C  2C
3A  3B  3C  3D
```

```java
public class TheaterSeats {

    public static void main(String[] args) {
        int numRows = 9;
        int numColumns = 15;

        for ( int i = 1 ; i <= numRows ; i++ ) {
            char seat = 'A';
            for ( int j = 1 ; j <= numColumns ; j++ ) {
                System.out.print(i + "" + seat + " ");
                seat++;
            }
            System.out.println();
        }
    }
}
```

Output from this solution:

```
1A  1B  1C  1D  1E  1F  1G  1H  1I  1J  1K  1L  1M  1N  1O
2A  2B  2C  2D  2E  2F  2G  2H  2I  2J  2K  2L  2M  2N  2O
3A  3B  3C  3D  3E  3F  3G  3H  3I  3J  3K  3L  3M  3N  3O
4A  4B  4C  4D  4E  4F  4G  4H  4I  4J  4K  4L  4M  4N  4O
5A  5B  5C  5D  5E  5F  5G  5H  5I  5J  5K  5L  5M  5N  5O
6A  6B  6C  6D  6E  6F  6G  6H  6I  6J  6K  6L  6M  6N  6O
7A  7B  7C  7D  7E  7F  7G  7H  7I  7J  7K  7L  7M  7N  7O
8A  8B  8C  8D  8E  8F  8G  8H  8I  8J  8K  8L  8M  8N  8O
9A  9B  9C  9D  9E  9F  9G  9H  9I  9J  9K  9L  9M  9N  9O
```

3. (30 Points) What is the output of the following program?

```java
public class Switch3 {

    public static void main(String[] args) {
        for (int i = 5; i >= 0; i--) {
            switch (i) {
            case 0:
                System.out.println(i + ":" + i * 2);
            case 1:
                System.out.println(i + ":" + i * 4);
            case 2:
                System.out.println(i + ":" + i * 6);
                break;
            case 3:
                System.out.println(i + ":" + i * 7);
                break;
            case 4:
                System.out.println(i + ":" + i * 8);
            default:
                System.out.println(i + ":" + i * 9);
                break;
            }
        }
    }
}
```

Output:

```
5:45
4:32
4:36
3:21
2:12
1:4
1:6
0:0
0:0
0:0
```

4. (30 Points) What is the output of the following program?

```java
public class BreakContinue3 {

    public static void main(String[] args) {
        for (int i = 0; i <= 12; i += 4) {
            for (int j = 0; j <= 12; j += 4) {
                if (i == j) {
                    break;
                } else if (i < j) {
                    continue;
                }
                System.out.println("i = " + i + " : " + "j = " + j);
            }
        }
    }
}
```

Output:

```
i = 4 : j = 0
i = 8 : j = 0
i = 8 : j = 4
i = 12 : j = 0
i = 12 : j = 4
i = 12 : j = 8
```

5. (30 Points) Write a complete Java program to read a list of exam grades given as int's in the range of
    0 to 100 into an array. You can assume that the maximum number of grades is 100. Use a negative
    number as a sentinel value to indicate the end of the input. (The negative value is used only to end
    the loop, do not use it in your calculations.)

```java
import java.util.Scanner;

public class GradesArray {

    public static void main(String[] args) {
        int arr[] = new int[100];
        Scanner scnr = new Scanner(System.in);
        int numGrades = 0;
        int sumVal = 0;

        for (int i = 0; i < arr.length; i++) {
            System.out.println("Enter a grade : ");
            arr[i] = scnr.nextInt();

            if (arr[i] < 0) {
                break;
            } else {
                sumVal = sumVal + arr[i];
                numGrades++;
            }
        }
        double avg = sumVal / numGrades;

        int lessThanAvg = 0;
        int greaterThanAvg = 0;

        for (int i = 0; i < numGrades; i++) {
            if (arr[i] >= avg) {
                greaterThanAvg++;
            } else {
                lessThanAvg++;
            }
        }

        System.out.println("Average Grade = " + avg);
        System.out.println("Number of grades = " + numGrades);
        System.out.println("Number of grades >= average = " + greaterThanAvg);
        System.out.println("Number of grades < average = " + lessThanAvg);
    }
}
```

1. (10 Points) true or false?

a. Given the following variable definitions:
 	
int numPeople = 10, numCars = 2;
char userKey = 'q';
boolean found = false;
 	
The logical expression:
 	
(numPeople == 10) && (numCars < =2) && (found) && (userKey == 'q');
	Evaluates To
	
	true
	
	or
	
	false

b. Given the following variable definitions: String str1 = "Apples", str2 = "apples"; The following expression: !str1.equalsIgnoreCase(str2);	**Evaluates To** true or **false**
c. Given the following variable definition: String userString = "I Love Java!!!" The following expression: Character.isWhiteSpace(userString.charAt(5));	**Evaluates To** true or **false**

d. Given:
 	
for (int i = 0 ; i < 5 ; i++) {
  if (i >= 0) {
    break;
  }
  System.out.println("i = " + i);
}
 	
The loop will print some output.
	true
	
	or
	
	false

e. Given the following array definition:
 	
int[] arr = new int[10];
 	
The following loop will encounter a problem:
 	
for (int i = 0 ; i < arr.length ; i++) {
  arr[i] += 1;
}
	true
	
	or
	
	false

2. (20 Points) Given `numRows` and `numColumns`, print a list of seats in a theater. Rows are lettered and columns are numbered.

For example, a theater with 3 rows and 4 columns should appear as follows:

```
A1 A2 A3 A4
B1 B2 B3 B4
C1 C2 C3 C4
```

```java
public class TheaterSeats {

    public static void main(String[] args) {
        int numRows = 9;
        int numColumns = 15;

        char row = 'A';
        for ( int i = 1 ; i <= numRows ; i++ ) {
            for ( int j = 1 ; j <= numColumns ; j++ ) {
                System.out.print(row + "" + j + " ");
            }
            row++;
            System.out.println();
        }
    }
}
```

Output from this solution:

```
A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12 A13 A14 A15
B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12 B13 B14 B15
C1 C2 C3 C4 C5 C6 C7 C8 C9 C10 C11 C12 C13 C14 C15
D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 D12 D13 D14 D15
E1 E2 E3 E4 E5 E6 E7 E8 E9 E10 E11 E12 E13 E14 E15
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 F13 F14 F15
G1 G2 G3 G4 G5 G6 G7 G8 G9 G10 G11 G12 G13 G14 G15
H1 H2 H3 H4 H5 H6 H7 H8 H9 H10 H11 H12 H13 H14 H15
I1 I2 I3 I4 I5 I6 I7 I8 I9 I10 I11 I12 I13 I14 I15
```

3. (30 Points) What is the output of the following program?

```java
public class Switch4 {

    public static void main(String[] args) {
        for (int i = 5; i >= 0; i--) {
            switch (i) {
            case 0:
                System.out.println(i + ":" + i);
            case 1:
                System.out.println(i + ":" + i * 3);
            case 2:
                System.out.println(i + ":" + i * 4);
                break;
            case 3:
                System.out.println(i + ":" + i * 9);
            case 4:
                System.out.println(i + ":" + i * 6);
            default:
                System.out.println(i + ":" + i * 5);
                break;
            }
        }
    }
}
```

Output:

```
5:25
4:24
4:20
3:27
3:18
3:15
2:8
1:3
1:4
0:0
0:0
0:0
```

4. (30 Points) What is the output of the following program?

```java
public class BreakContinue4 {

    public static void main(String[] args) {
        for (int i = 0; i <= 18; i += 5) {
            for (int j = 0; j <= 18; j += 5) {
                if (i == j) {
                    break;
                } else if (i < j) {
                    continue;
                }
                System.out.println("i = " + i + " : " + "j = " + j);
            }
        }
    }
}
```

Output:

```
i = 5 : j = 0
i = 10 : j = 0
i = 10 : j = 5
i = 15 : j = 0
i = 15 : j = 5
i = 15 : j = 10
```

5. (30 Points) Write a complete Java program to read a list of exam grades given as int's in the range of
0 to 100 into an array. You can assume that the maximum number of grades is 100. Use a negative
number as a sentinel value to indicate the end of the input. (The negative value is used only to end
the loop, do not use it in your calculations.)

```java
import java.util.Scanner;

public class GradesArray {

    public static void main(String[] args) {
        int arr[] = new int[100];
        Scanner scnr = new Scanner(System.in);
        int numGrades = 0;
        int sumVal = 0;

        for (int i = 0; i < arr.length; i++) {
            System.out.println("Enter a grade : ");
            arr[i] = scnr.nextInt();

            if (arr[i] < 0) {
                break;
            } else {
                sumVal = sumVal + arr[i];
                numGrades++;
            }
        }
        double avg = sumVal / numGrades;

        int lessThanAvg = 0;
        int greaterThanAvg = 0;

        for (int i = 0; i < numGrades; i++) {
            if (arr[i] >= avg) {
                greaterThanAvg++;
            } else {
                lessThanAvg++;
            }
        }

        System.out.println("Average Grade = " + avg);
        System.out.println("Number of grades = " + numGrades);
        System.out.println("Number of grades >= average = " + greaterThanAvg);
        System.out.println("Number of grades < average = " + lessThanAvg);
    }
}
```