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1. **(12 points; 3 points each) Define the following terms:**

   a. **Computer**

   **Programmable Electronic device that can STORE, RETRIEVE, and PROCESS data.**

   b. **Computer Science**

   **Study of algorithms and their efficient implementation in a computer**

   c. **Programming Language**

   **A set of rules, symbols, and special words used to construct programs.**

   d. **Algorithm**

   **Logical sequence of steps to solve a problem**

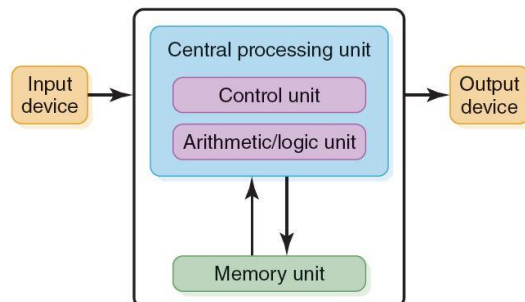2. **(6 points) Label the units/devices in the diagram for the von Neumann architecture given below:**



**FIGURE 5.1** The von Neumann architecture.

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3. **In the first column write the century or year to the corresponding value in Column B. Then match the answers in Column C to the correct value in Column B. See example in grey.**
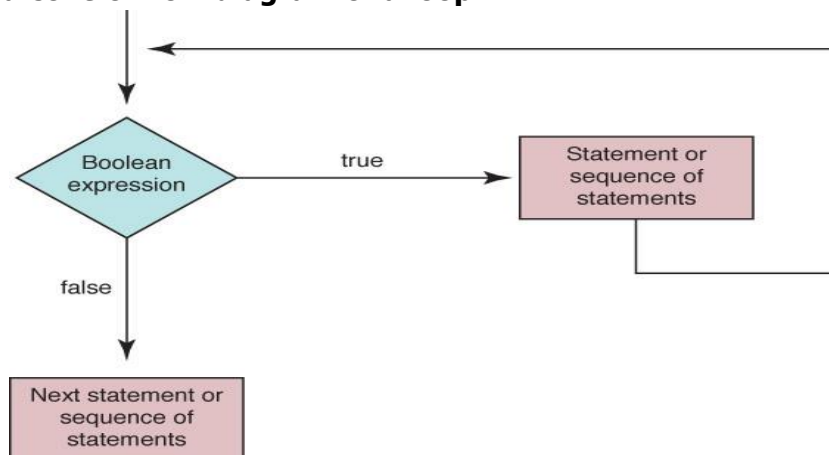   **(1 point each; 22 points total)**

| Century or Year | Column B | Column C |
|---|---|---|
| **1971-1980** | **L** **4th Generation Hardware** | A. **First computer used to predict outcome of a presidential election** |
| **18th Century** | **D** **Joseph Jacquard** | B. **Transistor** |
| **1951** | **A** **Univac I** | C. **Developed concept of a loop** |
| **19th Century** | **H** **Charles Babbage** | D. **Inventor of loom that used a series of punched cards** |
| **19th Century** | **E** **Herman Hollerith** | E. **Revolutionized the census** |
| **1959 – 1965** | **J** **2nd Generation Software** | F. **Calculating Machine that included multiplication and division** |
| **17th Century** | **F** **Leibniz Machine** | G. **British Mathematician that developed a test for AI** |
| **19th Century** | **C** **Ada Lovelace** | H. **Analytical Machine** |
| **1936** | **G** **Alan Turing** | I. **Instrument to record numeric values and on which a human can perform basic arithmetic** |
| **1944** | **K** **Harvard Mark I** | J. **High Level Languages** |
| **1951 – 1959** | **B** **1st Generation Hardware** | K. **IBM automatic sequence controlled calculator given to Harvard** |
| **16thCent/Ancient** | **I** **Abacus** | L. **Large Scale Integration** |

4. **(5 points) Draw a control flow diagram of a loop.**

For the following short-answer questions, check your work carefully, since no partial credit can be given. Note that "output" means what will be printed on the display screen.

5. (10 points) Given the following code fragment, state clearly and precisely what the output will be:

                                        **6 and 6**

   ```
   int j = 6;
   int k = 2;
   k = j;
   System.out.println(j + " and " + k);
   ```

6. (10 points) Given the following code fragment, state clearly and precisely what the output will be:

   ```
   int b = 12;
   System.out.println("First " + --b);              First 11
   System.out.println("Then " + b);                 Then 11
   ```

7. (10 points) Given the following code fragment, state clearly and precisely what the output will be:

   ```
   int a = 5;
   System.out.println("First " +  a++);             First 5
   System.out.println("Then " +  a);                Then 6
   ```

8. (5 points) Write the following Java statement using a compound operator:
   ```
   gradeTotal = gradeTotal + labTotal;
   ```

   **gradeTotal += labTotal;**

9. (5 points) For the following identifiers, which are legal and which are not?

   a. $total **legal**
   b. 1sum **not legal**
   c. employee_Name **legal**
   d. student Id **not legal**
   e. account# **not legal**

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**10. (10 points) Below, within the given program "shell," and write the code fragment that asks the user for an integer number. Get the number as input. Then, if the number is negative, print the message "Your number is negative." Otherwise, print the message, "Your number is nonnegative."**

```java
public class PosOrNeg {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        // code your variable declarations and logic below:


        int userNumber = 0;

        System.out.println("Please enter a number");
        userNumber = input.nextInt();

        if (userNumber < 0){
            System.out.println("Your number is negative");}
        else{
            System.out.println("your number is nonnegative");}



    }
}
```

**11. (5 points) What would you name the file of the above program?**

**PosOrNeg.java**

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**Bonus**

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1. **(5 points) What country just granted citizenship to a robot for the first time?**

## Saudi Arabia

Saudi Arabia has become the first country to give a robot citizenship. Oct 26, 2017

2. **(5 points) What is the output of the following program?**

```
1  /************************
2  *****Midterm Bonus********
3  ************************/
4
5  public class NestedWhileLoop {
6      public static void main(String[] args) {
7
8      int outerLoop = 1;
9
10     while(outerLoop < 4){
11
12        int innerLoop = 3;
13
14        while(innerLoop < 6){
15           System.out.println(outerLoop + " : " + innerLoop);
16           innerLoop++;
17           }
18
19        outerLoop++;
20        }
21
22     }
23 }
```

```
1 : 3
1 : 4
1 : 5
2 : 3
2 : 4
2 : 5
3 : 3
3 : 4
3 : 5
```