**Exercise 1**

**3.10 Compare and contrast the if single-selection statement and the while repetition statement.**

* **Similarities:**
  + Both use a condition to determine whether to execute a block of code.
  + Both can alter the flow of execution in a program.
* **Differences:**
  + if is a **single-selection statement**; it executes a block of code **once** if the condition is true.
  + while is a **repetition statement**; it continues executing a block of code **as long as** the condition remains true.

**3.11 What happens when a Java program divides one integer by another?**

* In Java, dividing one integer by another using / results in **integer division** (the fractional part is discarded).

**3.12 Describe the two ways in which control statements can be combined.**

1. **Sequential execution:** One statement follows another in sequence.
2. **Control structures combination:**
   * **Selection (if, if-else, switch)** for decision-making.
   * **Repetition (while, for, do-while)** for loops.

**3.13 Which type of repetition is appropriate?**

* **Sum of first 100 positive integers:** A **counter-controlled** for loop is best:

java

Copy code

int sum = 0;

for (int i = 1; i <= 100; i++) {

sum += i;

}

* **Sum of an arbitrary number of positive integers:** A **sentinel-controlled** while loop is appropriate:

java

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Scanner input = new Scanner(System.in);

int sum = 0, number;

System.out.print("Enter a number (-1 to stop): ");

while ((number = input.nextInt()) != -1) {

sum += number;

}

**3.14 Difference between preincrement and postincrement**

* **Preincrement (++x)**: Increments x **before** using its value.
* **Postincrement (x++)**: Uses the current value of x **before** incrementing.

java

Copy code

int x = 5;

System.out.println(++x); // Output: 6

System.out.println(x++); // Output: 6 (but now x = 7)

**3.15 Identify and correct errors in the code**

* **(a) Incorrect semicolon and mismatched quotes**

java

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if (age >= 65)

System.out.println("Age is greater than or equal to 65");

else

System.out.println("Age is less than 65");

* **(b) Variable total is not initialized**

java

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int x = 1, total = 0;

while (x <= 10) {

total += x;

++x;

}

* **(c) Missing braces ({})**

java

Copy code

while (x <= 100) {

total += x;

++x;

}

* **(d) Infinite loop (y keeps increasing)**

java

Copy code

while (y > 0) {

System.out.println(y);

--y; // Should decrement y instead of incrementing

}