### Exercise 1

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

- \*Similarity:\* Both if and while statements use conditions to control program flow.

- \*Difference:\* if executes only once if the condition is met, while while continues executing as long as the condition is true.

#### 3.11 Explain what happens when a Java program attempts to divide one integer by another.

- When dividing two integers, Java performs \*integer division\*, discarding the fractional part.

- To avoid losing precision, at least one operand should be a \*floating-point number\* (double or float).

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

1. \*Sequential execution:\* One statement follows another.

2. \*Nesting:\* One control statement inside another.

#### 3.13 What type of repetition is appropriate for sum calculations?

- \*First 100 positive integers:\* Use a for loop (for (int i = 1; i <= 100; i++)).

- \*Arbitrary number of integers:\* Use a while loop with user input until they indicate they are done.

#### 3.14 Difference between preincrementing and postincrementing a variable

- \*\*Preincrement (++x): Increases the value before using it.

- \*\*Postincrement (x++): Uses the current value first, then increases it.

#### 3.15 Identify and correct errors in the following code:

\*a)\*

java

if (age >= 65)

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

else

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

\*b)\*

java

int x = 1, total = 0;

while (x <= 10) {

total += x;

++x;

}

\*c)\*

java

while (x <= 100) {

total += x;

++x;

}

\*d)\*

java

while (y > 0) {

System.out.println(y);

--y;

}

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### Exercise 2

#### 3.17 (Gas Mileage Calculator)

- Use Scanner to input miles and gallons.

- Compute miles per gallon = miles / (double) gallons.

- Use a loop to allow multiple entries and compute cumulative MPG.

#### 3.18 (Credit Limit Calculator)

- Read account details from Scanner.

- Compute new balance: balance = beginning balance + charges - credits.

- Display "Credit limit exceeded" if the balance is over the limit.

#### 3.19 (Sales Commission Calculator)

- Compute earnings: 200 + (sales \* 0.09).

- Use a loop to input multiple items and sum their values.

#### 3.20 (Salary Calculator)

- If hours worked > 40, calculate overtime.

- Use formula:

java

if (hours > 40)

pay = (40 \* rate) + ((hours - 40) \* rate \* 1.5);

else

pay = hours \* rate;

#### 3.21 (Find Largest Number)

- Use a loop to input 10 numbers.

- Keep track of the \*largest\* value using:

java

if (number > largest)

largest = number;

#### 3.22 (Tabular Output)

- Use nested loops to print the table.

#### 3.23 (Find Two Largest Numbers)

- Track \*largest\* and \*second largest\* using comparisons.

#### 3.24 (Validating User Input)

- Keep asking for input until 1 or 2 is entered:

java

while (input != 1 && input != 2) {

System.out.print("Enter 1 or 2: ");

input = scanner.nextInt();

}

#### 3.25 (Checkerboard Pattern)

- Use loops and System.out.print("\* ") to create the pattern.

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### Making a Difference

#### 3.38 (Enforcing Privacy with Cryptography)

- Encrypt:

1. Add 7 to each digit and take modulo 10.

2. Swap the first and third digits, and the second and fourth.

- Decrypt:

1. Reverse the swap.

2. Subtract 7 (or add 3 if modulo 10 was used).

#### 3.39 (World Population Growth)

- Use a loop to compute new population based on growth rate.

- Print a table of values.