Day 04 – Nested Loops & Pattern Problems

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📌 Day Overview

Day 04 was focused on **revising nested loop logic** and applying it to solve multiple **star and number pattern problems**.

Pattern problems are not about memorization — they are about:

- Understanding **row–column relationships**
- Controlling loops correctly
- Building strong **logic visualization skills**

🎯 Topics Revised

- Nested loops
- Loop flow control
- Relationship between rows and columns
- Pattern-based thinking

🗣 Why Pattern Problems Matter

Pattern questions are extremely important for:

- Strengthening loop fundamentals
- Improving logical thinking
- Preparing for beginner-to-intermediate DSA problems
- Building confidence with control flow

They act as a **bridge between basics and complex logic problems**.

🧩 List of Pattern Problems Solved

🚀 All the solutions are given: `Check the problems folder` 🤞🤞

⭐ Star Pattern Problems

1. Square Star Pattern

```
//    * * * * *
//    * * * * *
//    * * * * *
//    * * * * *
```

2. Right-Angled Triangle Star Pattern (Increasing)

```
/**
 *    *
 *    * *
 *    * * *
 *    * * * *
 *    * * * * *
 *
 */
```

3. Inverted Right-Angled Triangle Star Pattern

```
/**
 *    * * * * *
 *    * * * *
 *    * * *
 *    * *
 *    *
 *
 */
```

4. Right-Aligned Triangle Star Pattern

```
/**
 *            *
 *          * *
 *        * * *
 *      * * * *
 *    * * * * *
 */
```

🔢 Number Pattern Problems

6. Increasing Number Triangle Pattern

```
/**
 *   1
 *   1 2
 *   1 2 3
 *   1 2 3 4
 *   1 2 3 4 5
 */
```

7. Repeated Number Triangle Pattern

```
/**
 *   1
 *   2 2
 *   3 3 3
 *   4 4 4 4
 *   5 5 5 5 5
 */
```

8. Decreasing Number Triangle Pattern

```
/**
 *   1 2 3 4 5
 *   1 2 3 4
 *   1 2 3
 *   1 2
 *   1
 */
```

🔁 Binary (0–1) Pattern Problems

9. Binary Triangle Pattern (Fixed Start)

```
/**
 *   1
 *   1 0
 *   1 0 1
 *   1 0 1 0
 *   1 0 1 0 1
 *   1 0 1 0 1 0
 *
 */
```

10. Binary Triangle Pattern (Alternate Start Per Row)

```
/**
 *   1
 *   0 1
 *   0 1 0
 *   1 0 1 0
 *   1 0 1 0 1
 *
 */
```

🔍 Key Learnings

- Outer loop controls **rows**

- Inner loop controls **columns / elements per row**

- Most patterns are based on:

  - `row number`

  - `column number`

  - simple mathematical relations

⚠️ Common Mistakes to Avoid

- Mixing row and column logic
- Hardcoding values instead of using loop variables
- Not dry-running patterns before coding

By solving & revising the today's concepts and solving these patterns problems your loop's logic will become stronger and you are ready to increase your level 🚀