***ELDO HUB – Data Science***

**Iteration Hackathon challenge- (2 hours)**

These challenges cover common loop patterns—counting, searching, flagging, nested loops—and demonstrate infinite‑loop avoidance and sequence iteration. Solutions use both for and while loops, Boolean flags, and Pythonic idioms.

## Challenge 1: Counting Vowels in a Sentence

### Description

Write a function that counts how many vowels (a, e, i, o, u, case‑insensitive) appear in a given sentence.

### Roles

* **Coder:** Implement count\_vowels(sentence) using a for loop.
* **Tester:** Prepare ≥5 test cases (empty string, no vowels, all vowels, mixed case).
* **Presenter:** Demonstrate the function on sample inputs and explain the loop logic.

## Challenge 2: Detecting Prime Numbers in a Range

### Description

Given two integers start and end, print all primes between them (inclusive).

### Roles

* **Coder:** Implement is\_prime(n) and loop with for n in range(start, end+1).
* **Tester:** Verify edge cases (start > end, ranges with no primes, small ranges).
* **Presenter:** Explain the nested loops and early exit via break.

## Challenge 3: Guess‑and‑Check with Limited Attempts

### Description

Hard‑code a secret number between 1–50. Prompt the user up to **5** times to guess it. After each guess, print “Too low”, “Too high”, or congratulate and exit. If all attempts fail, reveal the secret.

### Roles

* **Coder:** Write a while loop controlling attempts and branching on guess comparison.
* **Tester:** Simulate correct and incorrect guess sequences; test boundary guesses.
* **Presenter:** Walk through loop flow and the else: clause on the while.

## Challenge 4: Nested Loops for Pattern Printing

### Description

Print a multiplication table up to **n × m** (e.g., n=4, m=5), formatting as a grid.

### Roles

* **Coder:** Use nested for loops; format output with f‑strings.
* **Tester:** Check for various table sizes (1×1, 3×3, 4×7).
* **Presenter:** Demonstrate row and column iteration and explain nested flow.