

COURSE: AI Assisted Coding

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BATCH-34

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### Lab 3: Prompt Engineering: Improving prompt and context management

**Objective:** To explore how variations in prompt structure affect the quality, completeness, and accuracy of responses from a large language model.

**Requirements:**

- VS Code with GitHub Copilot or Cursor API and/or Google Colab with Gemini
- Tasks to be completed are as below.

#### Task 1: Conceptual Understanding in Physics

##### Scenario

Suppose that you are a data assistant developer for an EdTech company that uses ChatGPT to answer student queries related to introductory physics.

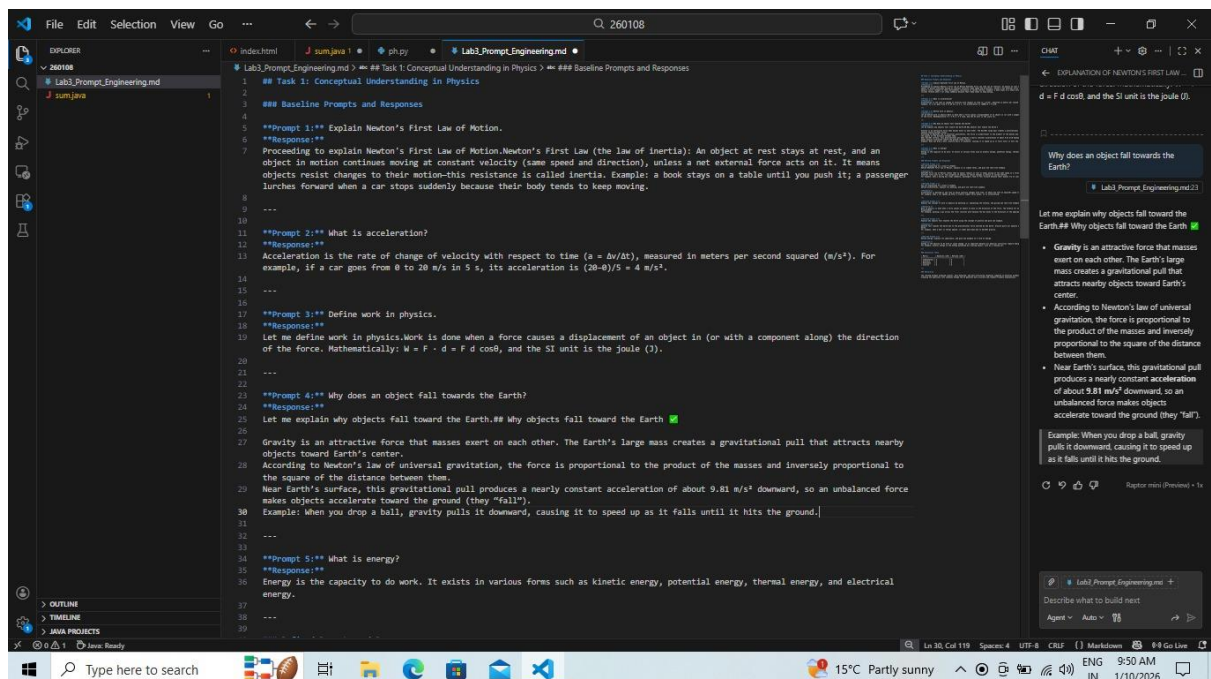
**Tasks to be completed**

##### 1. Baseline Prompt Testing

Choose 5 typical user queries, for example:

“Explain, What, Define, Why, What”

- Run these prompts in a chat-based AI model and record the raw responses.



##### 2. Prompt Refinement

Rewrite each query using the following strategies:

- Add 5 different contexts (school level, competitive exam, real-life application, mathematical focus, conceptual focus).
- Make the task explicit (e.g., “List and explain Newton’s three laws with one real-world example each.”).
- Break the query into subtasks (definition → explanation → example).

Run these prompts in a chat-based AI model and record the raw responses.

The screenshot shows a VS Code editor with a file named 'Lab3\_Prompt\_Engineering.md'. The file contains several prompts for explaining physics concepts. The right sidebar shows a chat window with the AI's response to the first prompt, explaining Newton's First Law in simple terms and providing a real-life example of a bus stopping.

### 3. Evaluate Outputs

Score AI responses on a scale of 1–5 using:

- Completeness
- Accuracy
- Relevance
- Clarity

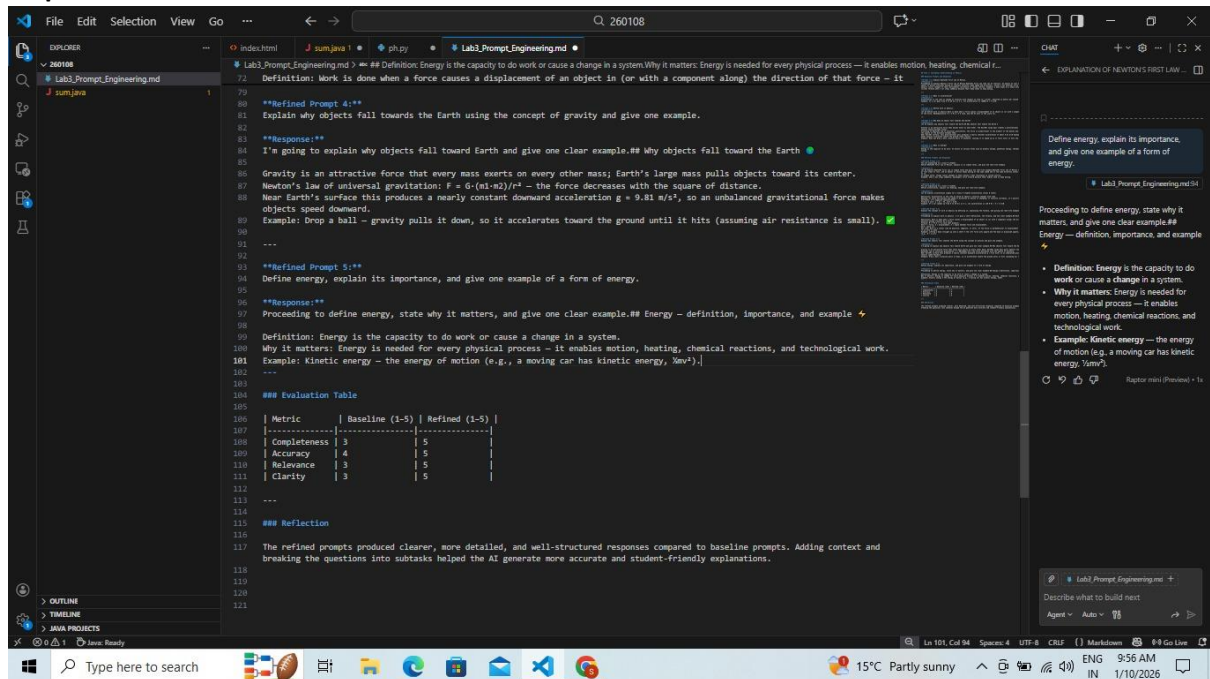
Run these prompts in a chat-based AI model and record the raw responses.

Present results in a comparative table.

### 4. Reflection

Discuss how contextual and structured prompts influenced the depth and correctness of

responses.



## Task 2: Programming Fundamentals (Python)

### Scenario

Suppose that you are a data assistant developer for an EdTech platform that supports beginner programming students.

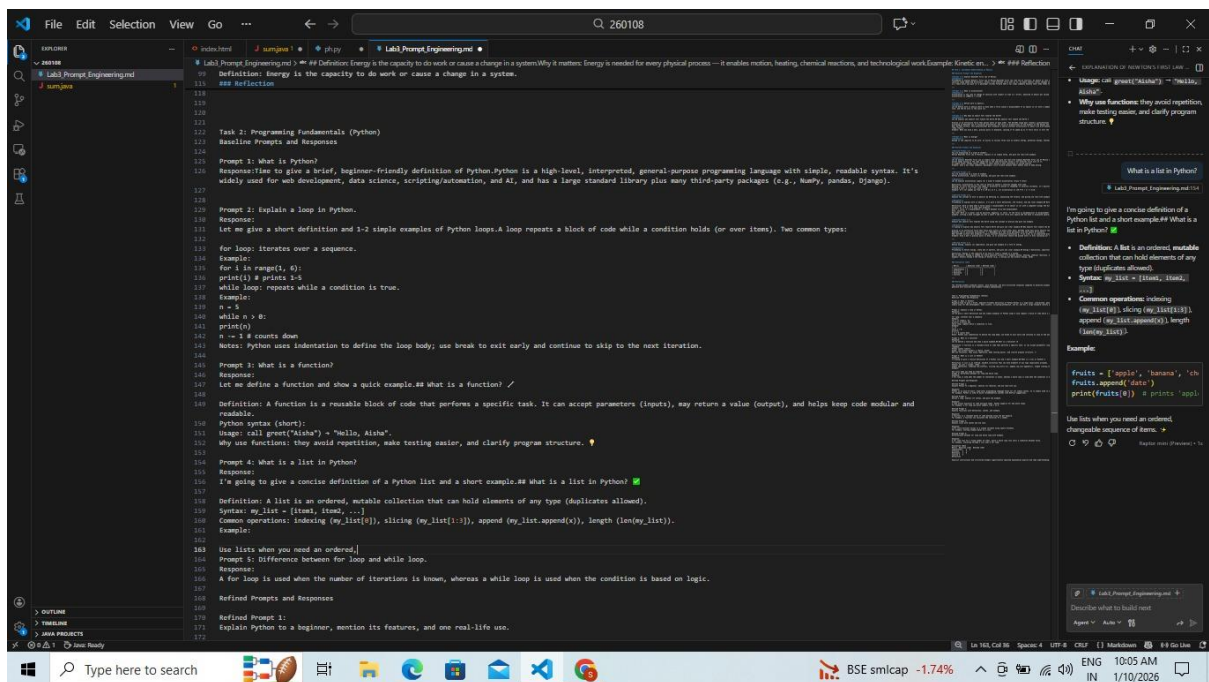
### Tasks to be completed

#### 1. Baseline Prompt Testing

Choose 5 common user queries, such as:

- “What, Explain, How, What, Difference”

Run these prompts in a chat-based AI model and record the raw responses.

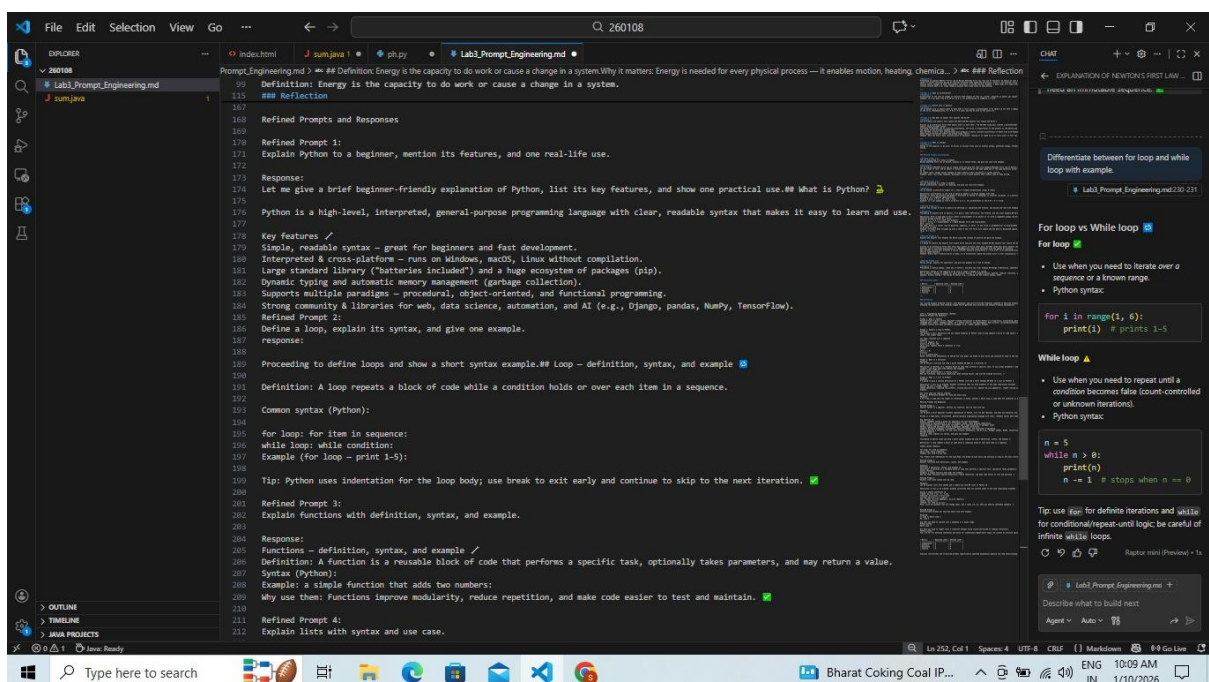


## 2. Prompt Refinement

Rewrite each query by:

- Adding 5 contexts (beginner, exam-oriented, real-world analogy, syntax-focused, performance-focused).
- Making instructions explicit (e.g., “Define a Python loop and show one example for for-loop and while-loop.”).
- Breaking into subtasks (definition → syntax → example → use case).

Run these prompts in a chat-based AI model and record the raw responses.



## 3. Evaluate Outputs



- Evaluate responses using completeness, accuracy, relevance, and clarity.
- Summarize findings in a table.

#### 4. Reflection

Analyze, how explicit subtasks improve code correctness and explanation quality.

```

Prompt_Engineering.md > ## Definition Energy is the capacity to do work or cause a change in a system. Why it matters: Energy is needed for every physical process — it enables motion, heating, chemical reactions, etc.
115 ## Reflection
211 Refined Prompt 4:
212 Explain lists with syntax and use case.
213
214 Response:
215 Let me explain lists with syntax and a simple use case. ## Lists in Python
216
217 Definition: A list is an ordered, mutable collection that can contain items of any type (duplicates allowed).
218
219 Syntax & common operations ✓
220 Create: my_list = [1, 'a', 3.14]
221 Indexing: my_list[0] = first item
222 Slicing: my_list[1:] = sublist
223 Add / remove: my_list.append(x), my_list.remove(x)
224 Length: len(my_list)
225 Iterate: for item in my_list: ...
226 Note: Lists are mutable (you can change them). Use a tuple ((a, b)) when you need an immutable sequence. ✓
227
228 Refined Prompt 5:
229 Differentiate between for loop and while loop with example.
230
231 Responses:
232 for loop vs while loop
233 For loop
234
235 Use when you need to iterate over a sequence or a known range.
236 Python syntax:
237 While loop
238
239 Use when you need to repeat until a condition becomes false (count-controlled or unknown iterations).
240 Python syntax:
241 Tip: use for for definite iterations and while for conditional/repeat-until logic; be careful of infinite while loops.
242
243
244
245
246 | Metric | Baseline (1-5) | Refined (1-5) |
247 |-----|-----|-----|
248 | Completeness | 3 | 5 |
249 | Accuracy | 4 | 5 |
250 | Relevance | 3 | 5 |
251 | Clarity | 3 | 5 |
252
253
254 Explicit instructions and structured prompts significantly improved explanation quality and code understanding.
255
256

```

### Task 3: Data Science and Machine Learning Concepts

#### Scenario

Suppose that you are a data assistant developer for an EdTech company offering data science courses.

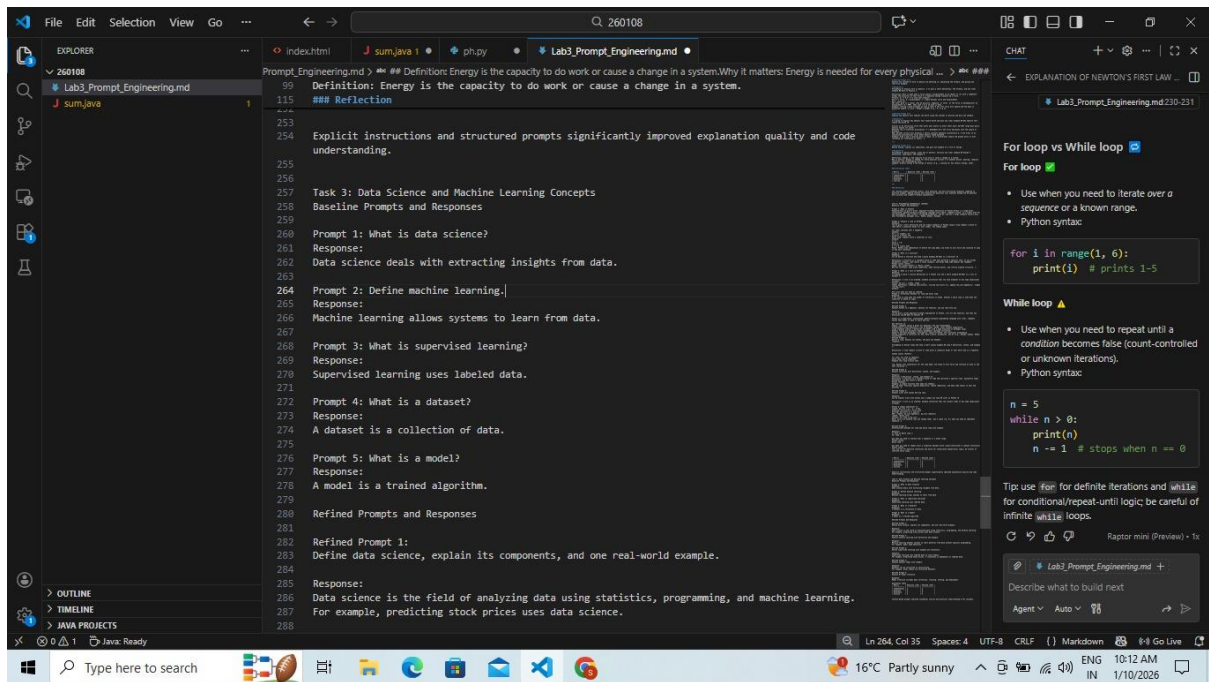
#### Tasks to be completed

##### 1. Baseline Prompt Testing

Select 5 typical queries, for example:

- “What, Explain, What, Define, What”

Run these prompts in a chat-based AI model and record the raw responses.



## 2. Prompt Refinement

Refine each query by:

- Adding 5 contexts (academic, industry, beginner-friendly, mathematical, interview-focused).
- Making tasks explicit (e.g., “Define supervised learning and explain it with one real-world example.”).
- Breaking into subtasks (definition → types → example → limitation).

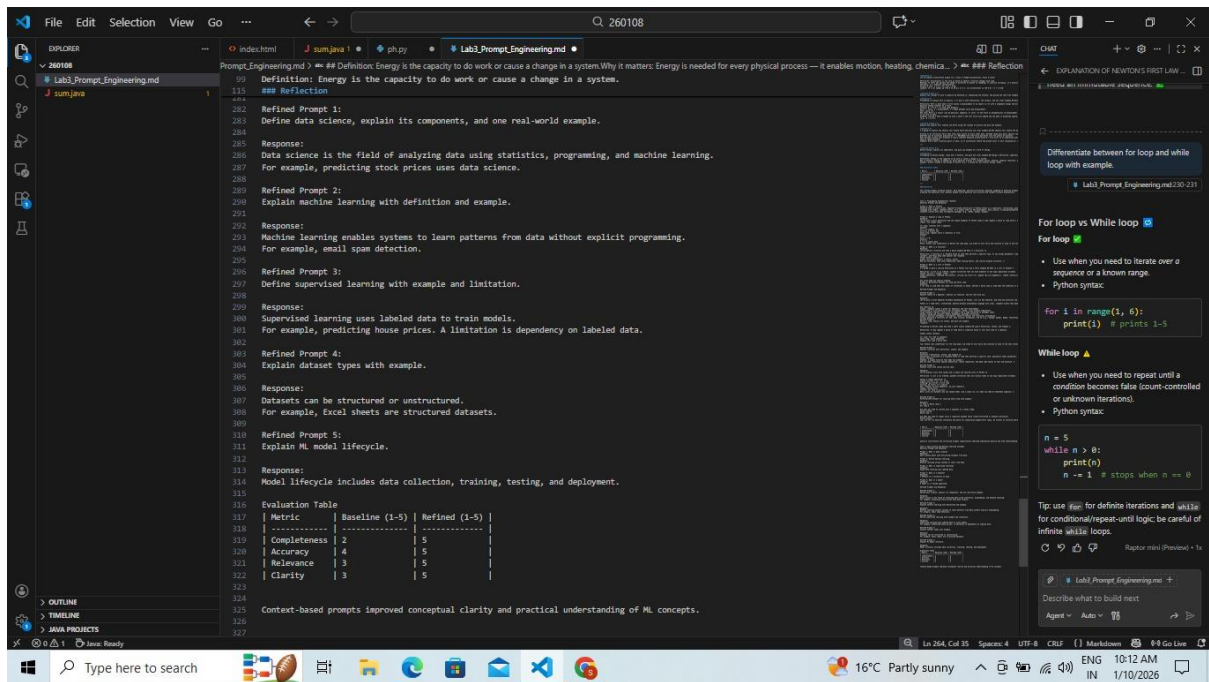
Run these prompts in a chat-based AI model and record the raw responses.

## 3. Evaluate Outputs

Score outputs using the given metrics and present results in a table.

## 4. Reflection

Reflect on how context management affects conceptual clarity in technical domains.



## Task 4: Database and SQL Queries

### Scenario

Suppose that you are a data assistant developer supporting students learning database systems.

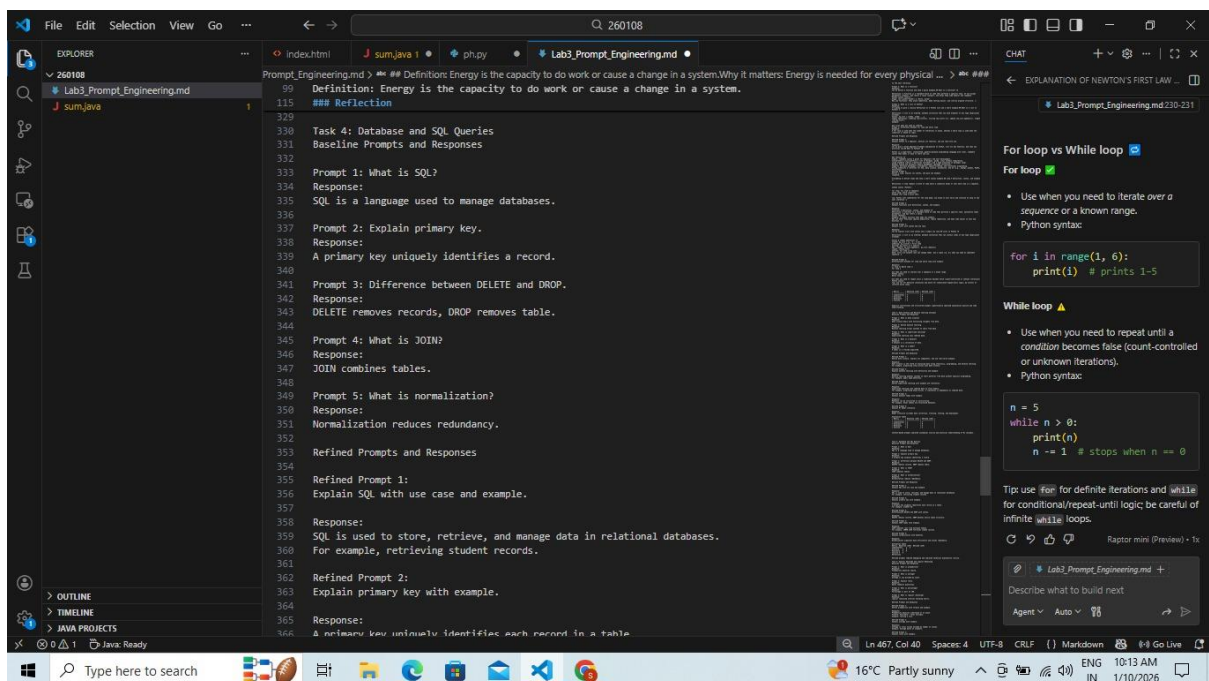
### Tasks to be completed

#### 1. Baseline Prompt Testing

Choose 5 common queries, such as:

- “Explain, What, Difference, where, how”

Run these prompts in a chat-based AI model and record the raw responses.



## 2. Prompt Refinement

Rewrite each prompt by:

- Adding 5 contexts (theory exam, practical lab, interview prep, real-world database, optimization focus).
- Making instructions explicit (e.g., “Explain SQL JOIN types with syntax and examples.”).
- Breaking into subtasks (definition → syntax → example → use case).

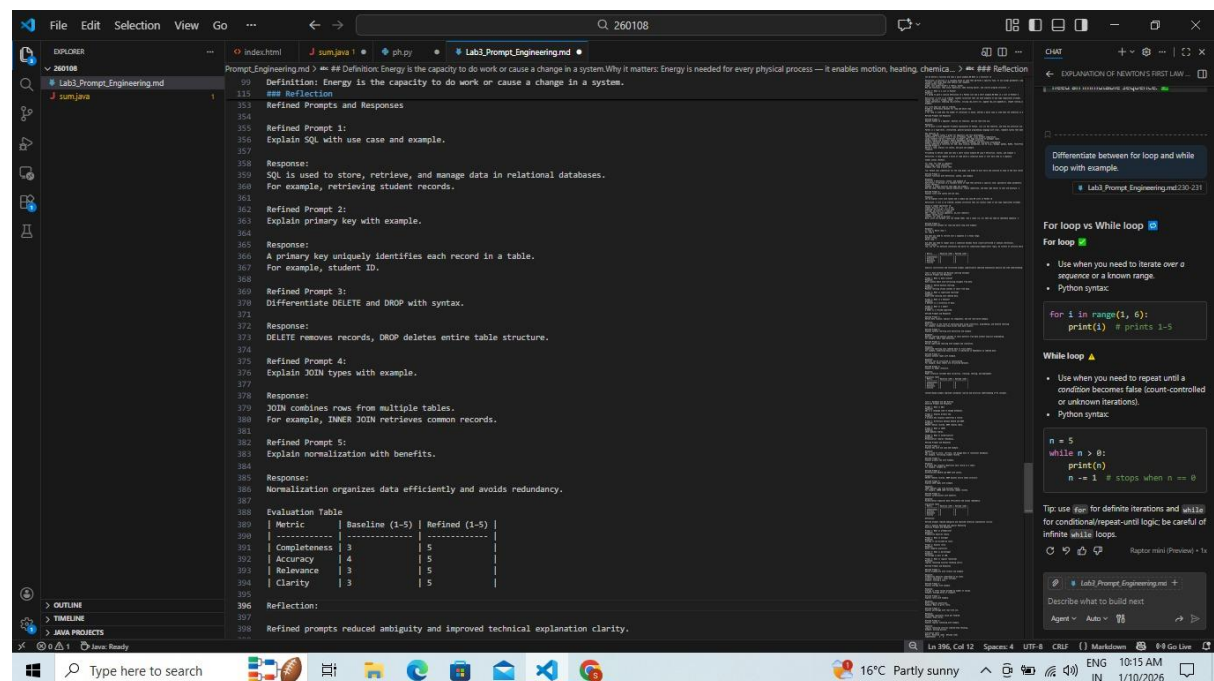
Run these prompts in a chat-based AI model and record the raw responses.

## 3. Evaluate Outputs

Evaluate responses using the four metrics and summarize results in a comparison table.

## 4. Reflection

Discuss how refined prompts reduce ambiguity in technical explanations.



## Task 5: General Aptitude and Logical Reasoning

### Scenario

Suppose that you are a data assistant developer for an EdTech company focused on aptitude and competitive exam preparation.

### Tasks to be completed

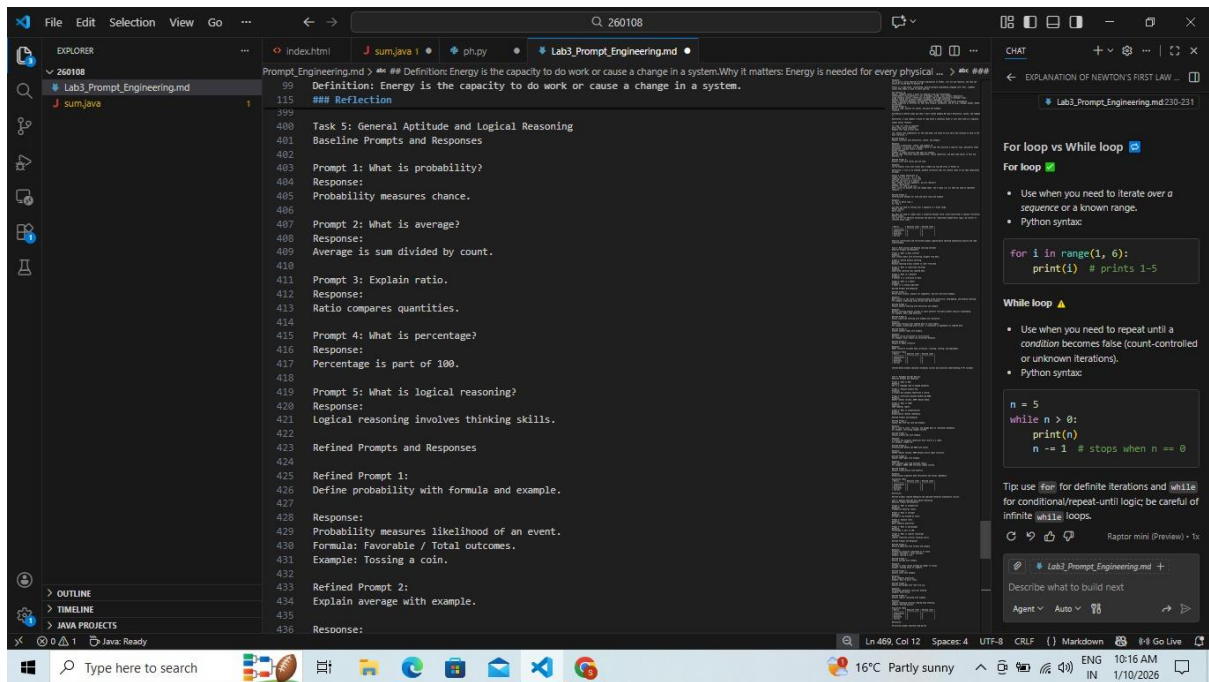
#### 1. Baseline Prompt Testing

Select 5 user queries, for example:

- “Explain, What, Difference, where, how”

Run these prompts in a chat-based AI model and record the raw responses.





## 2. Prompt Refinement

Rewrite each query by:

- Adding 5 contexts (school exams, competitive exams, real-life analogy, formula-based, step-by-step solving).
- Making tasks explicit (e.g., “Define probability and solve one simple numerical example.”).
- Breaking into subtasks (definition → formula → example → common mistakes).

Run these prompts in a chat-based AI model and record the raw responses.

## 3. Evaluate Outputs

- Score responses using completeness, accuracy, relevance, and clarity.
- Present findings in a table.

## 4. Reflection

Reflect on how structured prompts improve step-by-step reasoning and learner understanding.

File Edit Selection View Go ... 260108

EXPLORER

- 260108
  - Lab3\_Prompt\_Engineering.md
  - sum.java

Lab3\_Prompt\_Engineering.md

```
99 Definition: Energy is the capacity to do work or cause a change in a system.
115 ### Reflection
425 Refined Prompt 1:
426 Define probability with formula and example.
427
428 Response:
429 Probability measures likelihood of an event.
430 Formula: favorable / Total outcomes.
431 Example: Tossing a coin.
432
433 Refined Prompt 2:
434 Explain average with example.
435
436 Response:
437 Average is total values divided by number of values.
438 Example: Average marks of students.
439
440 Refined Prompt 3:
441 Explain ratio with example.
442
443 Response:
444 Ratio compares quantities.
445 Example: Boys to girls ratio.
446
447 Refined Prompt 4:
448 Explain percentage with real-life use.
449
450 Response:
451 Percentage represents value per hundred.
452 Example: Exam scores.
453
454 Refined Prompt 5:
455 Explain logical reasoning with example.
456 Response:
457 Logical reasoning involves step-by-step thinking.
458 Example: Solving puzzles.
459
460 Evaluation Table
461 | Metric | Baseline (1-5) | Refined (1-5) |
462 |-----|-----|-----|
463 | Completeness | 2 | 5 |
464 | Accuracy | 4 | 5 |
465 | Relevance | 3 | 5 |
466 | Clarity | 3 | 5 |
467
468 Reflection:
469 Structured prompts improved step-by-ste
```

CHAT

EXPLANATION OF NEWTON'S FIRST LAW

Differentiate between for loop and while loop with example

Lab3\_Prompt\_Engineering.md:230-231

For loop vs While loop

For loop

- Use when you need to iterate over a sequence or a known range.
- Python syntax:

```
for i in range(1, 6):
    print(i) # prints 1-5
```

While loop

- Use when you need to repeat until a condition becomes false (count-controlled or unknown iterations).
- Python syntax:

```
n = 5
while n > 0:
    print(n)
    n -= 1 # stops when n == 0
```

Tip use `for` for definite iterations and `while` for conditional/repeat-until logic. be careful of infinite while loops.

Describe what to build next

Agent Auto

16°C Party sunny 10:17 AM 1/10/2026