

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.

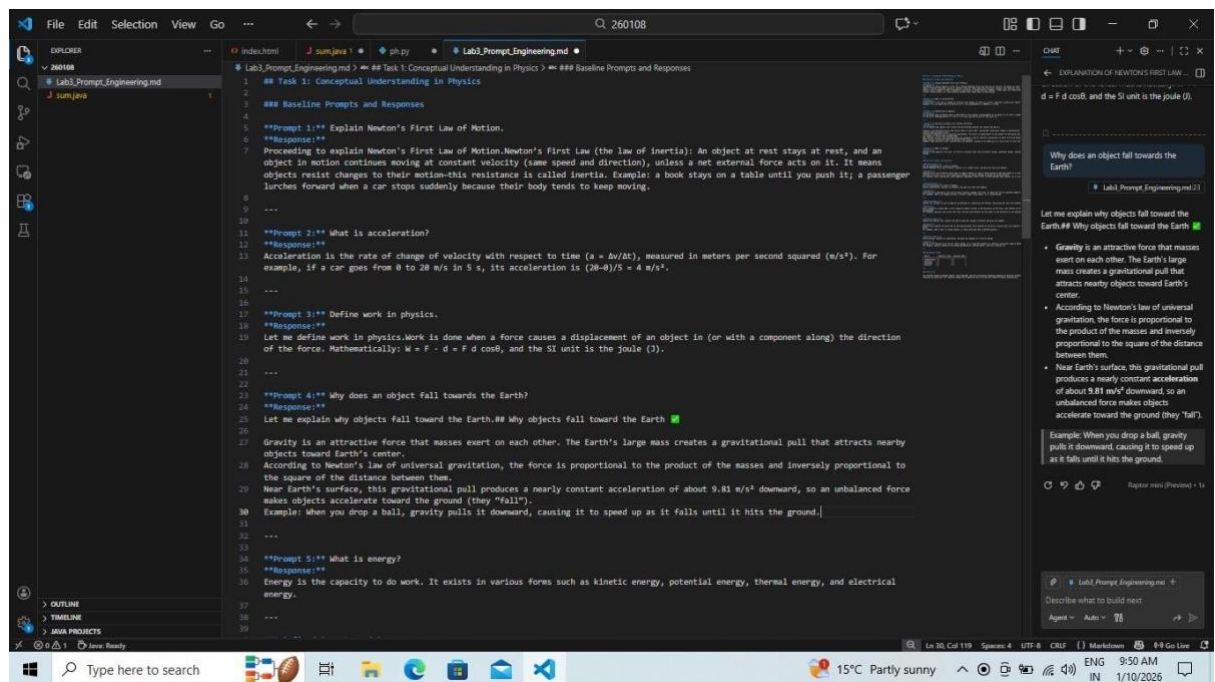
Tasks to be completed

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.

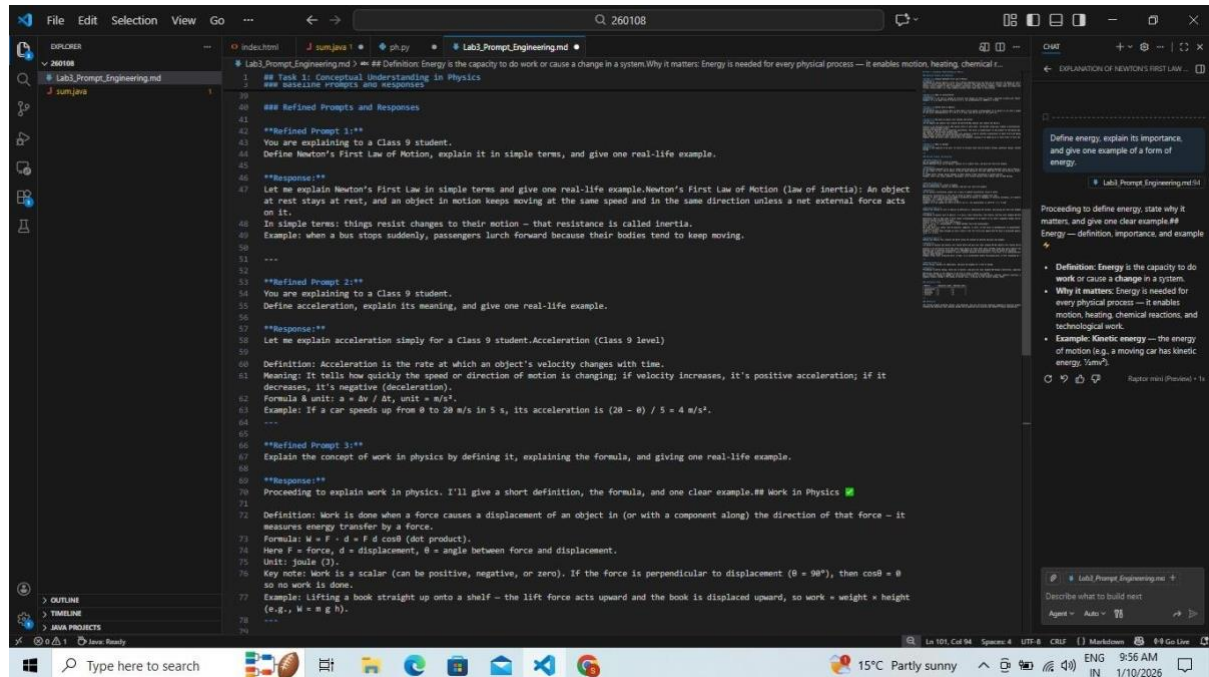


2. Prompt Refinement

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.



3. Evaluate Outputs

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

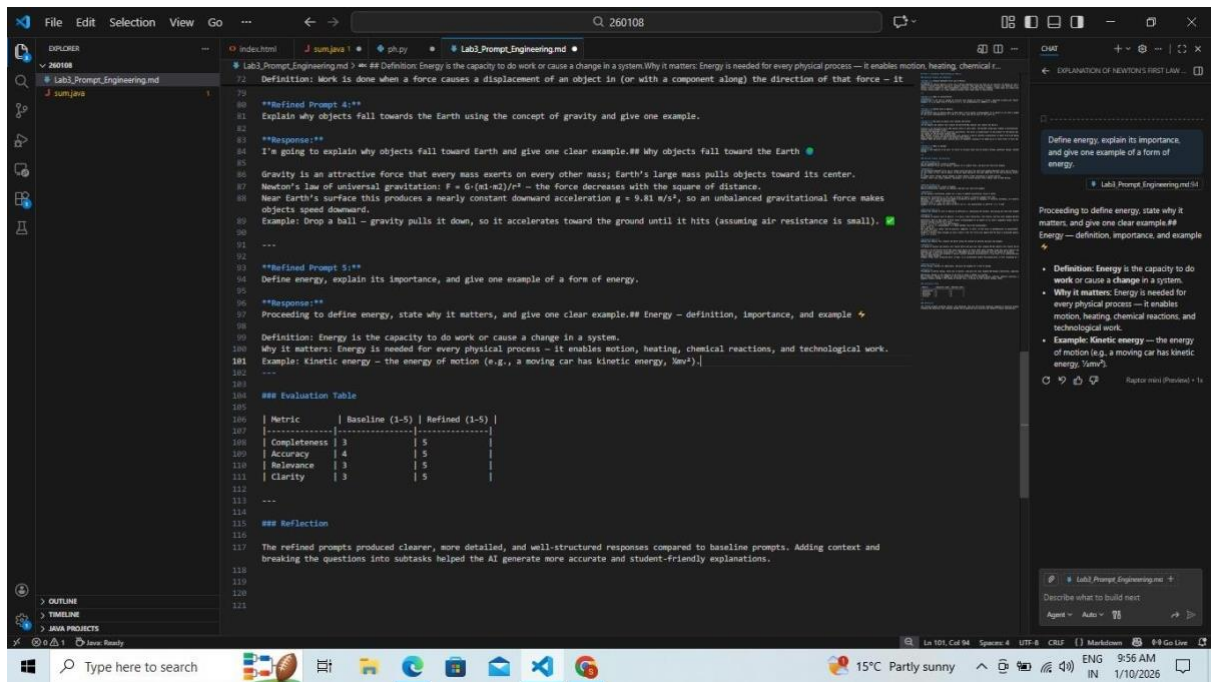
- Completeness
- Accuracy
- Relevance
- Clarity

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

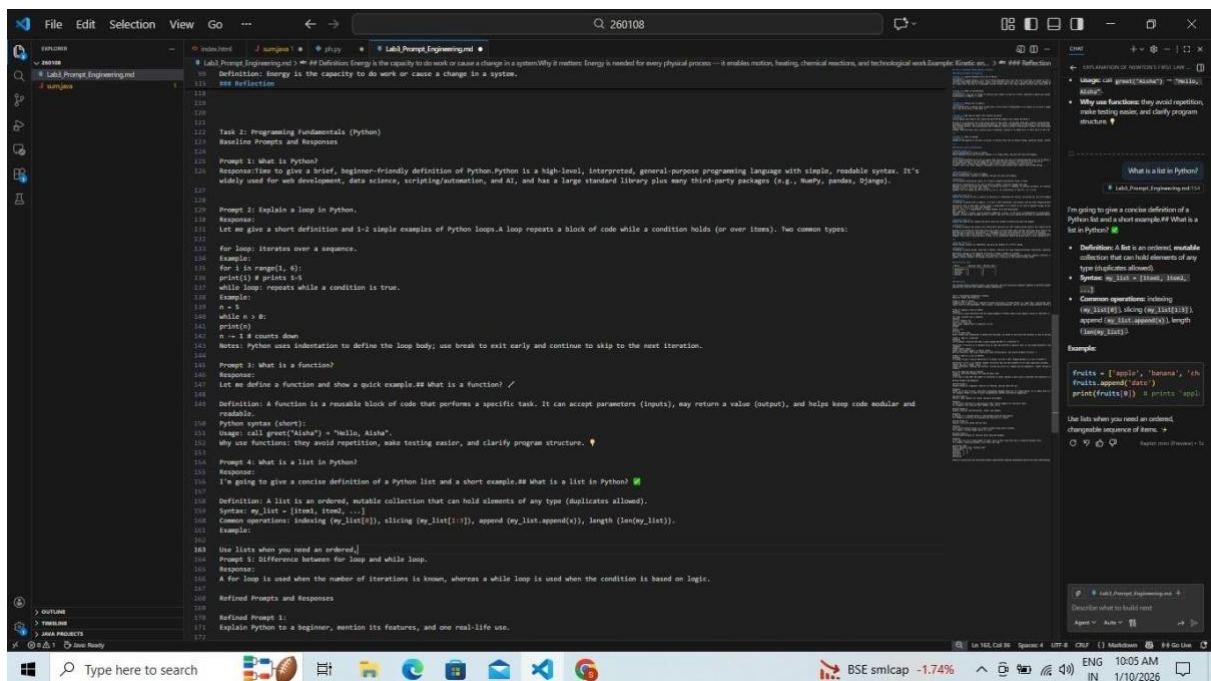
Suppose that you are a data assistant developer for an EdTech platform that supports beginner programming students. Tasks to be completed

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 forloop and while-loop.”).
- Breaking into subtasks (definition → syntax → example → use case).

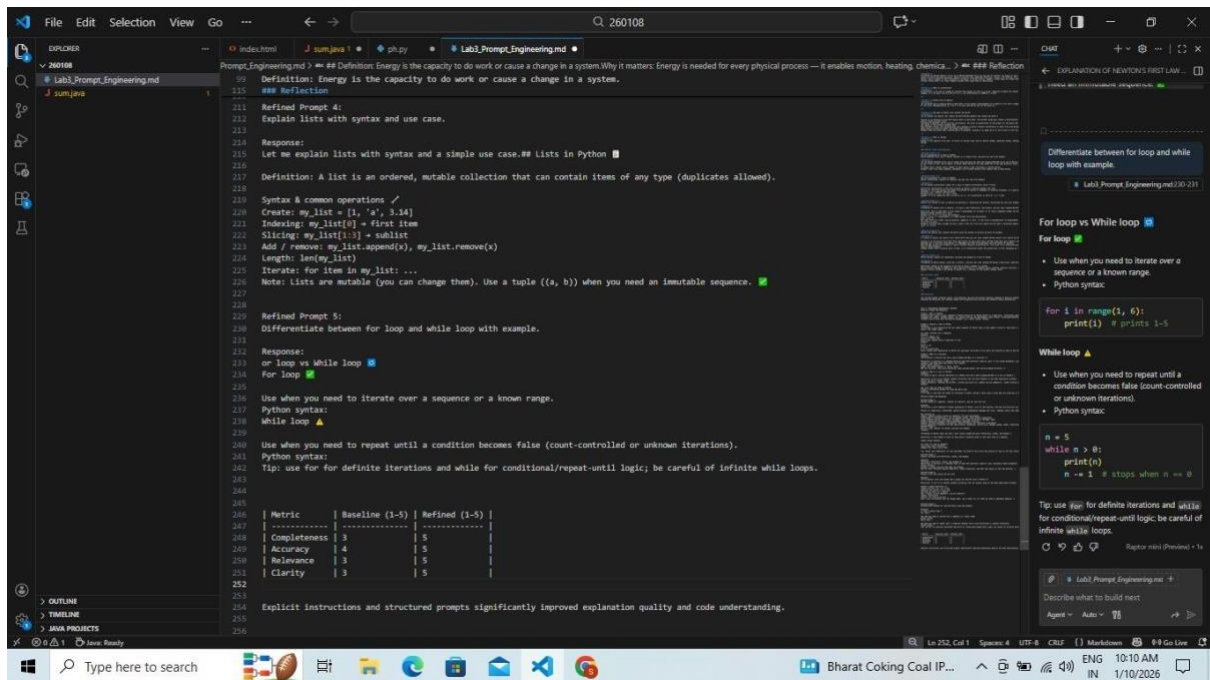
Run these prompts in a chat-based AI model and record the raw responses.

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.



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.

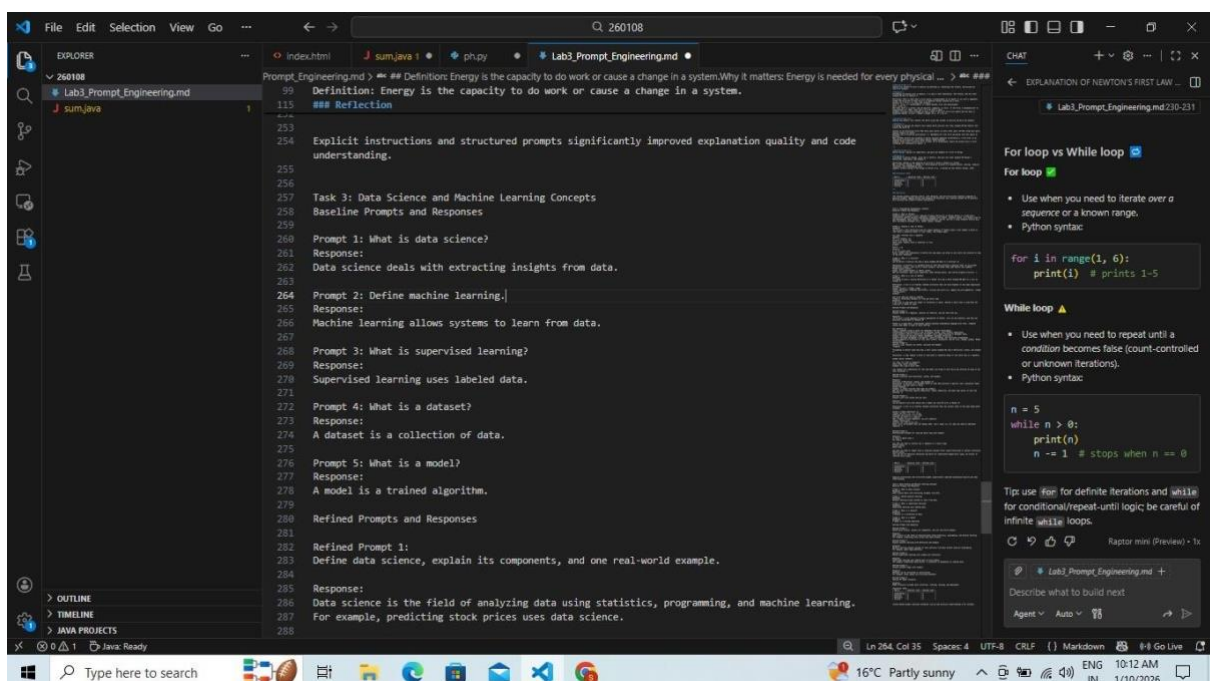
Tasks to be completed

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).

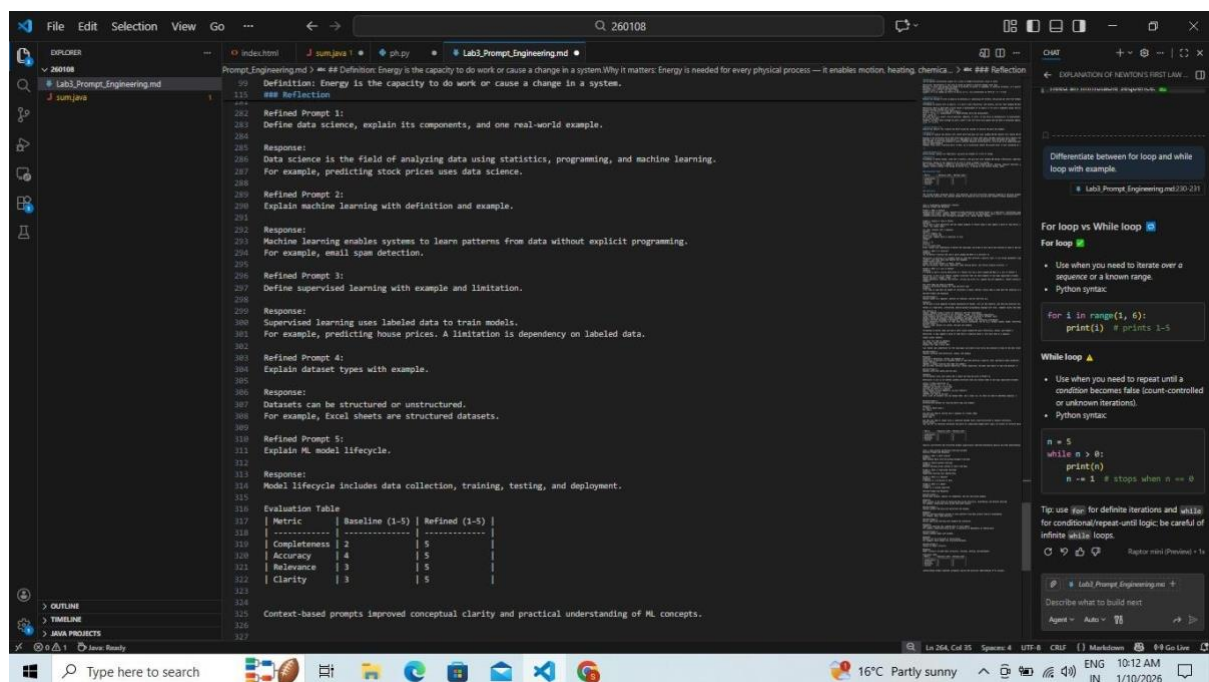
Run these prompts in a chat-based AI model and record the raw responses.

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.

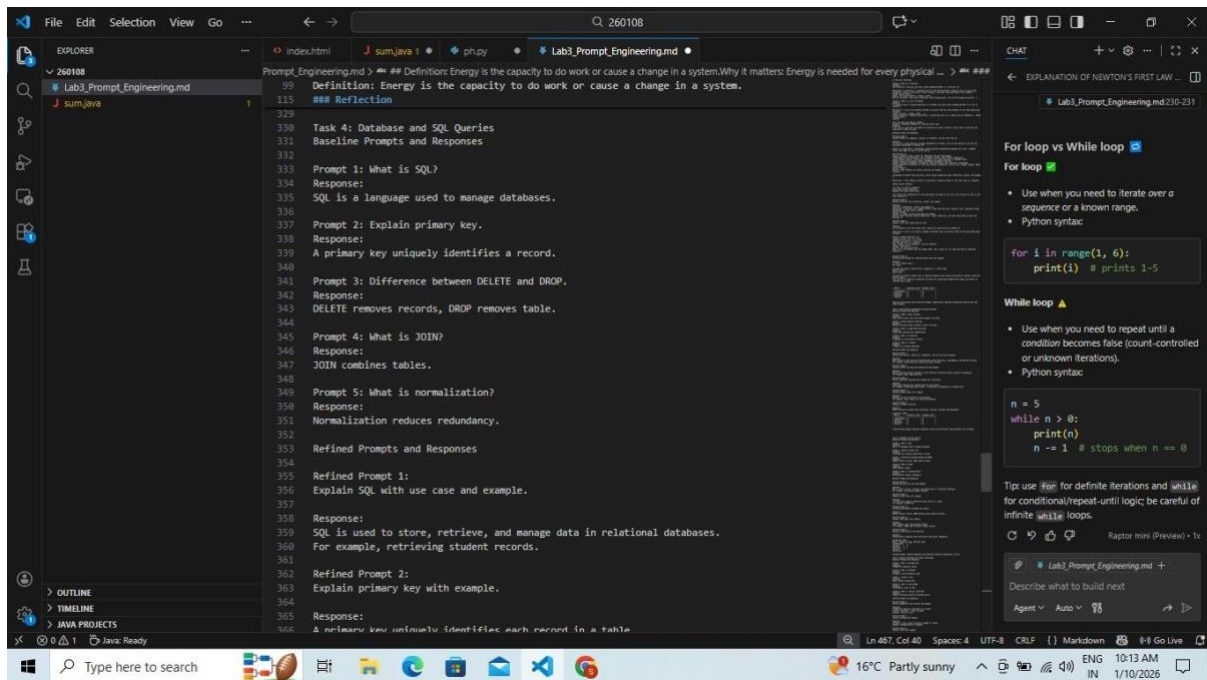
Tasks to be completed

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).

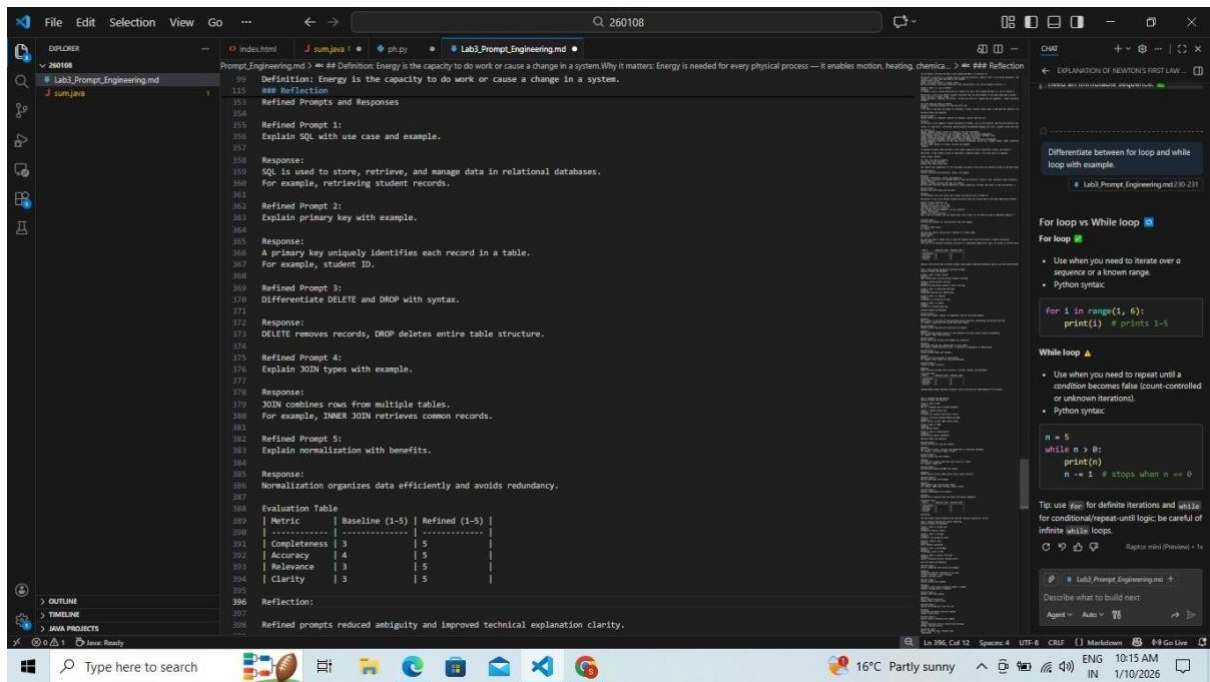
Run these prompts in a chat-based AI model and record the raw responses.

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

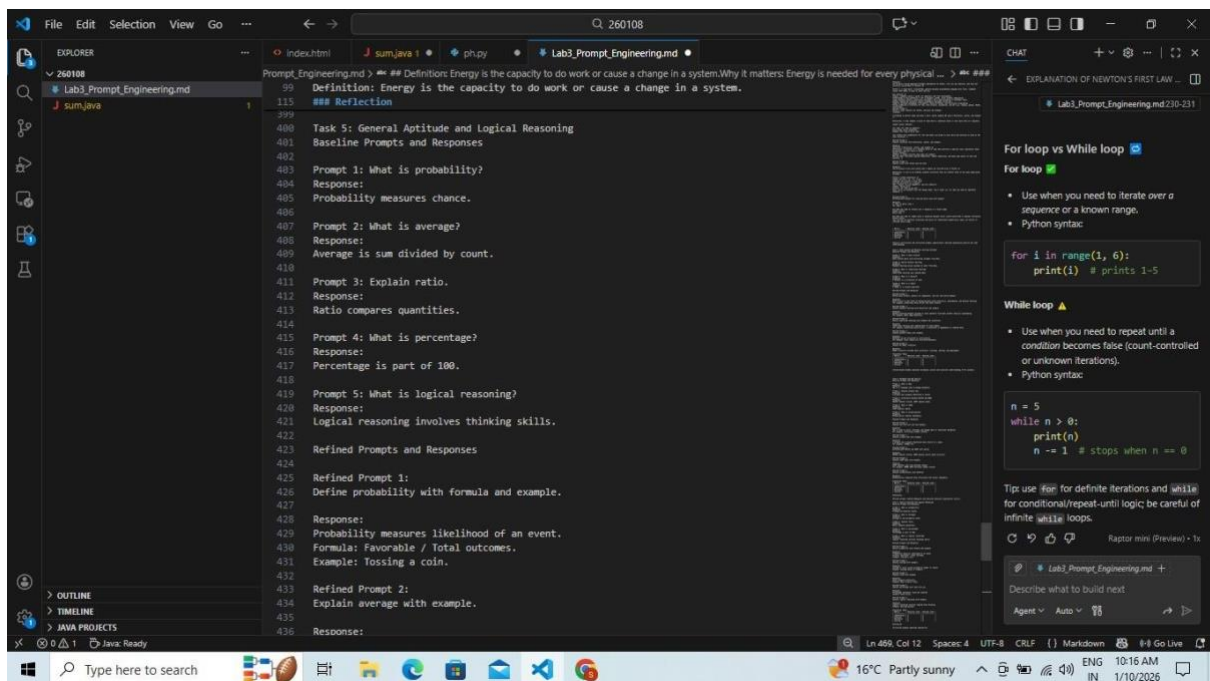
Suppose that you are a data assistant developer for an EdTech company focused on aptitude and competitive exam preparation. Tasks to be completed

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.

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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, chemistry... == ### 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
457 Response:
458 Logical reasoning involves step-by-step thinking.
459 Example: Solving puzzles.
460
461 Evaluation Table
462 | Metric | Baseline (1-5) | Refined (1-5) |
463 |-----|-----|-----|
464 | Completeness | 2 | 5 |
465 | Accuracy | 4 | 5 |
466 | Relevance | 3 | 5 |
467 | Clarity | 3 | 5 |
468
469 Reflection:
470 Structured prompts improved step-by-step
  
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