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## Applying Collaborative Learning Principles to Teaching with GenAI: A Pre-Calculus Assignment Example

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### Article Info

### Abstract

#### Article History

Received:  
27 August 2025

Revised:  
22 December 2025

Accepted:  
7 February 2026

Published:  
27 March 2026

#### Keywords

Generative artificial intelligence  
Collaborative learning  
Assignment design  
Student-AI partnerships

As generative artificial intelligence (GenAI) becomes increasingly available to students in higher education, educators face the challenge of designing assignments that promote meaningful learning while minimizing misuse. This conceptual paper demonstrates ways in which six principles originally developed to enhance collaborative learning during group work (positive interdependence, cognitive load management, individual accountability, promotive interaction, social skills development, and group processing) can be effectively applied to a GenAI-supported STEM assignment. We present a detailed analysis of a pre-calculus assignment designed using research-based collaborative learning principles and illustrate how structured prompting, role definition, and iterative reflective cycles can increase the likelihood that GenAI enhances rather than replaces human learning. The proposed framework supports the development of critical thinking, communication, and metacognitive awareness. We conclude with general recommendations for adapting these principles across disciplines and suggest directions for future empirical research and faculty development to support effective GenAI integration in student assignments.

**Citation:** Singer-Freeman, K., Payne, C., & Zimmerman, S. (2026). Applying collaborative learning principles to teaching with GenAI: A pre-calculus assignment example. *International Journal of Education in Mathematics, Science and Technology (IJEMST)*, 14(3), 975-988. <https://doi.org/10.46328/ijemst.5542>



ISSN: 2147-611X / © International Journal of Education in Mathematics, Science and Technology (IJEMST).  
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## Introduction

As Generative artificial intelligence (GenAI) tools become ubiquitous in academic settings, educators face a critical question: How can we ensure these tools enhance rather than hinder student learning? Students have expressed a strong desire for guidance on the appropriate uses of GenAI and are very interested in receiving this guidance from faculty (Singer-Freeman et al., 2025). We believe that an unexpected source of guidance comes from decades of research on collaborative learning. Although GenAI lacks emotion and agency, it can still support collaborative learning by engaging students in structured cognitive exchanges. Collaboration is not defined by sentience but by the distribution of thinking, mutual engagement, and iterative refinement. These are roles GenAI can fulfill. When used intentionally, GenAI can encourage students to clarify reasoning, explore alternatives, and reflect on their learning, aligning well with the principles of effective collaborative work. GenAI partnerships and human collaboration can both involve distributing cognitive tasks and managing dependencies between contributors who have different strengths and weaknesses. Singer-Freeman (2025) hypothesized that six principles that increase the learning gains from collaborative learning can be productively applied to assignments that require student-GenAI partnerships. This paper describes our creation of a pre-calculus assignment that integrates GenAI in ways that are guided by known best practices for collaborative learning assignments: positive interdependence, individual accountability, promotive interaction, social skills development, group processing, and cognitive load management (Singer-Freeman, 2025). We explain how each section of the assignment will support student learning and is guided by principles of effective collaborative learning, providing a model for educators seeking to create effective assignments in which GenAI supports rather than supplants student learning.

## Assignment Structure

The assignment includes four phases: 1) problem-solving; 2) communication; 3) collaborative review; and 4) reflection and synthesis. Students select problems from two categories: graphing rational functions and exploring inverse functions. In Phase 1 (Problem Solving), students work independently on one problem from each category in class, then using prompting protocols GenAI either verifies the student's solution or provides support as the student revises their incorrect solution. Students continue engaging with GenAI prompts and revising their work until they arrive at a correct solution. In Phase 2 (Communication) students write explanations of their problem-solving, submit these to GenAI for critique, and revise based on feedback. In Phase 3 (Collaborative Review) students review each other's work and discuss their learning processes. Finally, in Phase 4 (Reflection and Synthesis) students design future GenAI prompts, identify essential prerequisite knowledge, and compare their experience with GenAI support to that of peer collaboration. Students submit their original work, GenAI interaction logs, final solutions, initial and revised explanations, peer feedback exchanges, and reflections. The complete assignment can be seen in Appendix A.

## Positive Interdependence: Creating Mutual Dependence

A foundation of effective group work is positive interdependence in which group members need the knowledge or skills of other group members to succeed (Alavi & McCormick, 2008). Positive interdependence prevents the

division of labor and ensures that all group members are engaged in the work by creating situations in which different contributions are essential to group success. One element of designing effective GenAI supported assignments is determining ways in which the unique skills of humans and GenAI differ and then structuring assignments to require positive interdependence by having each contributor address the other's limitations (Singer-Freeman, 2025).

GenAI's strength lies in its ability to rapidly analyze vast amounts of information, spotting patterns, missing elements, and outliers (American Bar Association, 2017; Korteling et al., 2021). GenAI is very effective at identifying errors, and helping students break through a fixed approach by suggesting alternate solution strategies. However, humans are more skilled than GenAI at applying real-world context, understanding nuance, and reflecting on internal mental processes (Korteling et al., 2021). Incorporating GenAI into student work in ways that catch errors and reduce fixation on ineffective approaches while requiring students to make nuanced interpretations or reflect on their learning will create productive cycles in which human critical thinking and GenAI processing power complement each other.

### Assignment Application

The assignment creates multiple layers of positive interdependence. During the problem-solving phase students attempt initial solutions during class. This ensures that they independently complete the first step which provides the starting place in their learning. Students are explicitly told that their first (possibly incorrect) attempts are essential because their attempt will enable GenAI to provide targeted instruction that will help them to learn. This piece of the instruction supports positive interdependence as well as academic integrity. GenAI then serves as an error-detection system that guides students toward self-discovery. The specific prompt protocol—*"If I made an error, guide me to discover it through questions rather than giving me the answer directly"*—ensures that neither participant can complete the learning cycle independently. This task is structured to maintain student agency while leveraging GenAI capabilities. Students cannot passively accept GenAI corrections; they must reflect on their errors and generate new approaches. Conversely, GenAI cannot provide meaningful guidance without student reasoning to evaluate. We are aware that students could bypass the positive interdependence by ignoring the prescribed prompt and asking GenAI to "fix my work." This would dissolve the positive interdependence, converting the GenAI from a Socratic partner into a simple answer key and undermining the goal of guided self-discovery. To limit the likelihood of this happening it will be important to clearly communicate with students regarding the value of the learning that is being supported by the assignment instructions.

It is important to note that role definition targeting the unique strengths of humans and GenAI is crucial for productive interdependence. During the communication phase students articulate their reasoning in writing before receiving a GenAI critique, establishing human contribution as primary. The GenAI critique protocol (*"Please critique my mathematical explanation for clarity, completeness, and accuracy. Point out any gaps in my reasoning or unclear language. Ask me questions that will help me strengthen my explanation rather than rewriting it for me"*) capitalizes on GenAI's strength in noticing missing elements and provides an opportunity for GenAI to interrupt a fixed approach to a problem by encouraging alternate ways of thinking about the problem. The peer

discussion questions increase interdependence and encourage students to use their unique abilities to engage in metacognition by considering differences in the support for learning that are achieved when working with GenAI as compared to working with peers.

### **Individual Accountability: Ensuring Every Student Meets Learning Objectives**

An emerging body of research suggests that poorly designed GenAI-assisted learning is associated with an illusion of competence (Barba, 2025) that can result in reductions in critical thinking (Gerlich, 2025) or creativity (Habib et al., 2024). Individual accountability minimizes the risk by including features of assignments that ensure every group member is responsible for demonstrating mastery of all parts of a shared piece of work. The inclusion of individual accountability measures increases learning by preventing stronger members from dominating while others contribute minimally. To ensure that students learn, we must create GenAI-assisted assignments that require students to contribute in ways that lead to the acquisition of essential learning outcomes (Singer-Freeman, 2025). GenAI can support students most effectively when it provides scaffolding that allows students to develop targeted areas of competence. However, as students develop competence, GenAI support should fade so that summative evaluations can be accomplished individually. The goal is ensuring students can perform independently when needed, rather than becoming dependent on external cognitive support.

#### **Assignment Application**

The assignment implements individual accountability by richly documenting mastery of three student learning outcomes (SLOs). To evaluate the first SLO (analyze rational and inverse functions) students individually tackle challenging problems and engage with GenAI using a protocol that demands step-by-step explanations of their reasoning. This logged interaction provides direct evidence of their problem-solving process and iterative refinement. Their final solutions include explanations and are assessed both for mathematical accuracy and for accurate reasoning. To evaluate the second SLO (communicating mathematical reasoning clearly in writing) students describe their solution process, including their chosen initial approach, difficulties encountered, resulting adjustments in approach, and reasons for these actions. The GenAI critique protocol is designed to strengthen the clarity and completeness of the student's writing by providing questions that invite refinements rather than providing corrections. During the revision process students must demonstrate they can process feedback meaningfully and improve communication. This requires individual synthesis skills and demonstrates that students can learn from critique rather than simply accepting corrections. The submission of the student's initial explanations, GenAI critiques, and revised explanations allows evaluation of their iterative improvement. To evaluate the third SLO (metacognitive awareness of productive approaches to collaborative work) students design future GenAI prompts, identify essential prerequisite knowledge, and compare human and GenAI collaboration.

We are aware that the efficacy of the proposed audit trail depends on the student's honest engagement. For example, a student could circumvent accountability by using GenAI to write their mathematical explanation in Phase 2, even though the prompt explicitly forbids it, or by fabricating interaction logs. To reduce this possibility, instructors can add a specific reflection question that asks students to link a direct quote from the GenAI's critique

to a specific change they made in their revised explanation. This requires them to demonstrate a metacognitive connection between the feedback and their own work. Alternatively, making the peer review discussion a small, in-class activity would allow instructors to observe whether a student's ability to discuss their work is consistent with the sophistication of their written submission.

## Promotive Interaction: Encouraging Active Reasoning

Promotive interactions describe situations in which the product that emerges from a collaboration is stronger than the product that could have been created by any individual in the group (Scager et al., 2016). In effective collaborative learning, students encourage and challenge each other's reasoning, and the resulting cognitive friction deepens understanding (Dzemidzic Kristiansen et al., 2019). Intentional design can support promotive interactions in GenAI-assisted learning when GenAI is directed to function as a Socratic questioner, pushing students to examine assumptions and explore implications (Chiang et al., 2024; Singer-Freeman, 2025). Chatbots can play devil's advocate, presenting counter arguments that students must address. The use of iterative protocols can structure these interactions, ensuring that initial student responses are developed and refined through successive exchanges.

### Assignment Application

The assignment creates promotive interactions by having GenAI challenge student reasoning. The interaction protocol instructs GenAI to function as a Socratic questioner: *"Ask me to explain my reasoning at each step where you see confusion"* and *"respond to mistakes by asking challenging questions rather than giving answers."* This creates the cognitive friction essential for deep mathematical learning. When students make algebraic errors, for example, GenAI might ask: "What properties of rational functions are you applying here?" or "How does this step connect to your domain analysis?" These questions force students to explicitly articulate their mathematical reasoning. GenAI critiques of student explanations generate follow-up questions about clarity, completeness, and mathematical accuracy. Students must respond to challenges like: "What evidence supports your conclusion that this approach was most effective?" or "How might someone with a different mathematical background understand your explanation?" This pushes students to improve their mathematical communication rather than focusing solely on correctness.

Peer interaction during collaborative review provides a different type of promotive challenge. The group discussion questions are designed to invite comparative analysis: *"How did GenAI questioning compare to peer questioning in helping you learn?"* and *"What patterns did you notice in the types of errors GenAI identified?"* The success of this promotive interaction hinges on the quality of student engagement. To encourage deep engagement, instructors can provide a rubric that defines and rewards high-quality interactions. A structured feedback protocol—such as requiring students to identify one conceptual strength, one area for clearer communication, and ask one probing question—can reduce generic comments and promote the intended cognitive friction. The structured progression through phases ensures promotive interactions build complexity over time. Initial GenAI interactions focus on mathematical accuracy, communication critiques address explanation quality,

peer reviews incorporate multiple perspectives, and reflections synthesize learning across all interaction types. Each phase prepares students for more sophisticated reasoning in subsequent phases.

### **Social Skills Development: Building Communication Capabilities**

Effective collaboration requires strong social skills and is supported by explicit instruction in communication, conflict resolution, and shared decision-making (Mendo-Lázaro et al., 2018). Although there is less likely to be conflicts between students and GenAI or compromises that are often required in shared decision making, effective student-GenAI collaboration requires developing communication skills designed for GenAI interaction and understanding the importance of having the human make the important decisions that guide the final product (Singer-Freeman, 2025). Students must learn how to structure requests, provide context, specify desired outcomes, and iterate through cycles of clarification. Students should cultivate the ability to critically assess GenAI outputs and discern when human collaboration is more appropriate.

### **Assignment Application**

The assignment provides instruction and practice in multiple types of communication skills essential for both GenAI collaboration and human interaction. The prompting protocols teach students how to communicate effectively with GenAI systems by specifying desired interaction types, providing appropriate context, and establishing clear boundaries for GenAI assistance. For example, protocols for error-checking and explanation critiques teach students to define both the type of assistance they need and their preferred interaction style. Students learn to ask GenAI to guide them towards discovery rather than providing answers. This approach develops improved communication skills, enabling students to articulate their learning needs and set boundaries for productive collaboration with GenAI. Students develop their mathematical communication skills by writing and revising explanations of their thought processes. Students must articulate mathematical reasoning clearly, respond to critique constructively, and revise their communication based on feedback. This develops formal academic writing skills alongside mathematical expression capabilities.

Importantly, the assignment is intentionally designed to involve GenAI in ways that complement rather than replace human social learning. The peer review and group discussion phases ensure students maintain opportunities to practice human-to-human collaboration, developing interpersonal skills, emotional intelligence, and social awareness. Students practice giving constructive feedback, receiving criticism, and engaging in productive mathematical discussions. Group discussions may also provide an opportunity to practice conflict resolution when students have differing opinions or explanations. The group discussion questions require students to synthesize insights from multiple sources and articulate comparative analyses of different collaboration types.

### **Group Processing: Reflecting on Effectiveness**

Effective groups engage in regular reflection on how well they're functioning and how to improve (Johnson et al., 1990). This metacognitive element helps groups improve collaborations over time. For students to become skilled

learners they must develop awareness of when GenAI supports their learning and when it supplants their learning. This is often referred to as GenAI literacy.

Building reflective elements into assignments is essential for developing the discriminating awareness that is at the heart of GenAI literacy (Singer-Freeman, 2025).

### **Assignment Application**

The assignment embeds reflection throughout the learning process rather than treating it as an afterthought. This approach helps students develop metacognitive awareness of their collaboration effectiveness in real-time while building skills for future learning improvement. Students document their exchanges with GenAI, creating a record of what was said and how it was said, so that they become aware of how their thinking and interactions changed throughout the process. This process mirrors the group processing element of traditional collaborative learning by making collaboration dynamics explicit and analyzable. Students analyze their problem-solving approach systematically: their initial strategy selection, any difficulties encountered, the impact of GenAI questioning, and their reasoning behind each step.

The comparison of GenAI interactions with the peer interactions ("*Compare the benefits of GenAI assistance versus peer collaboration in your learning process. When would you choose each approach?*") increases awareness of collaboration dynamics while building individual metacognitive skills. The design of future GenAI prompts based on the effectiveness analysis encourages deeper considerations of the features of prompting that supports effective work using GenAI. Finally, the reflection on the impact of prerequisite knowledge helps students understand how foundational knowledge affects their collaboration success. The submission format also supports processing by requiring students to curate and present their complete learning journey. This comprehensive reflection structure ensures students develop awareness of when GenAI supports instead of supplants their learning, building the judgment essential for strategic technology use in future learning contexts.

### **Cognitive Load Management: Distributing Mental Demands**

Well-structured groups can solve more complex problems than individuals through strategic distribution of cognitive demands (Kirschner et al., 2009). GenAI can function as a way to distribute cognitive load by providing scaffolding that enables learning. The key element to consider when designing assignments is determining what specific learning students should experience and allowing GenAI to provide other elements of the task to free students up to dedicate cognitive resources to target learning areas (Singer-Freeman, 2025).

### **Assignment Application**

The assignment distributes cognitive load to optimize learning by having GenAI detect student errors and encourage elaborations, allowing students to focus on building conceptual understanding rather than checking every algebraic step. When students work on rational function analysis, for example, GenAI can verify their

factoring and algebraic simplifications while students concentrate on understanding domain restrictions, asymptote behavior, and graphical interpretation. Providing structured prompting protocols manages cognitive load by providing clear frameworks for the student-GenAI interaction. This frees students from the need to develop collaboration strategies and allows them to focus on mathematical problem-solving. The phase-based assignment structure reduces cognitive overload by separating different types of learning into manageable components. Because students build their submissions incrementally, the cognitive load is distributed across time, preventing end-of-assignment cognitive overload while maintaining accountability. This separation allows students to dedicate attention to each SLO without managing competing cognitive demands. GenAI provides scaffolding for communication development through critique without reducing the cognitive challenge. Whereas, in traditional assignments students might receive feedback on gaps in their explanations after submitting work, in this assignment students have the opportunity to improve their initial communications in response to GenAI feedback prior to submission. This cognitive load distribution enables students to engage with appropriately challenging mathematical problems, develop sophisticated communication skills, practice GenAI collaboration, engage in peer review, and reflect metacognitively; a combination that would create cognitive overload if managed simultaneously but becomes achievable through careful task structuring.

## Conclusions

This pre-calculus assignment demonstrates how proven principles from collaborative learning research can guide effective GenAI integration in mathematics education. Rather than viewing GenAI as a replacement for human interaction or a shortcut to task completion, the assignment structures GenAI as a collaborative partner that enhances learning through strategic interdependence, individual accountability, promotive interaction, communication skills, group processing, and cognitive load management. The assignment creates conditions in which students develop deeper mathematical understanding, stronger communication skills, and greater metacognitive awareness of their learning processes. The submission requirements provide evidence of learning across all domains while supporting student reflection and instructor assessment of collaboration effectiveness.

It is important to acknowledge the limitations of this assignment structure. We recognize that no pedagogical design can eliminate academic dishonesty, and determined students will find ways to circumvent the intended learning process. However, the framework presented here is designed to limit the incentive for cheating by shifting the focus from the final product to the documented process. By requiring students to submit initial attempts, detailed interaction logs, revisions, and metacognitive reflections, the assignment makes authentic engagement the more straightforward path. Fabricating a coherent and plausible set of responses would require a level of effort that likely meets or exceeds the work of completing the assignment honestly. Therefore, although this model is not "cheat-proof," it is designed to create an environment in which the path of least resistance aligns with genuine learning, thereby reducing the appeal of academic shortcuts.

By applying research-based collaborative learning principles systematically, educators can design assignments that use GenAI partnerships to enhance rather than undermine student learning. The parallel between collaborative learning and GenAI-assisted learning suggests that technology integration isn't fundamentally different from other

pedagogical challenges. The principles that foster effective collaboration among humans can also be applied to support meaningful partnerships between students and GenAI when applied thoughtfully to specific learning contexts (Singer-Freeman, 2025). The assignment model presented here provides a concrete framework that other educators can adapt to their specific content areas and learning objectives, demonstrating that effective GenAI integration is achievable through systematic application of established pedagogical principles. Table 1 includes a summary of the key principles with suggested applications to collaborative work and GenAI-supported assignments.

Table 1. Principle Applications to Group Work and GenAI-Supported Learning

Principle	Collaborative Work Strategies	GenAI Integration Strategy
Positive Interdependence	Jigsaw tasks; differentiated roles	Prompting protocols with defined roles; GenAI addresses blind spots, students reflect on reasoning and contextual relevance
Cognitive Load Management	Task distribution; scaffolding for complex problems	GenAI given non-central tasks to free cognitive resources; temporary scaffolding reduced as abilities develop
Individual Accountability	Individual assessments; peer evaluations	GenAI-free summative tasks; “Explain back to AI” exercises; interaction logs
Promotive Interaction	Debate; Socratic questioning	GenAI prompts challenge reasoning; multi-turn dialogues simulate cognitive friction
Social Skills Development	Communication training; conflict resolution; shared decision-making	Instruction in GenAI-specific communication; boundary-setting; peer collaboration integration
Group Processing	Reflection journals; team debriefs	GenAI interaction logs; comparison of GenAI vs. peer collaboration; metacognitive reflections

To advance the thoughtful integration of GenAI in education, future research should empirically test how collaborative learning principles impact student outcomes in GenAI-supported classrooms. Such studies will help validate and refine the proposed framework across diverse disciplines and learning contexts. As educators adopt these tools, it is also essential to address ethical considerations, including data privacy, algorithmic bias, and the transparency of GenAI-generated content. Finally, successful implementation will require targeted faculty development. Training programs should equip instructors with the pedagogical strategies and technical skills needed to design assignments that use GenAI to support and not supplant student learning.

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## Appendix. Pre-Calculus GenAI-Assisted Learning Assignment

*Task:* You'll individually solve two complex pre-calculus problems and then improve your answers using GenAI assistance. You will then communicate your reasoning and reflect on the learning process with support from GenAI and from other students.

*Importance:* This assignment develops mathematical problem-solving skills, mathematical communication skills and metacognitive awareness of how you learn most effectively. Completing the assignment prepares you for independent learning in advanced mathematics and will develop skill in using GenAI in ways that support deep learning.

*Learning Process:* You'll cycle through problem-solving, GenAI-guided error correction, written communication, peer review, and reflection to build deep understanding. Review the grading criteria at the end of the assignment before starting your work to be sure you fully understand what is expected of you.

*Task Criteria:* Success requires mathematical accuracy, clear communication, effective GenAI and peer collaboration, and thoughtful reflection on your learning process.

### Student Learning Outcomes (SLOs)

By the end of this assignment, you will be able to:

1. Analyze rational and inverse functions.
2. Communicate mathematical reasoning clearly in writing
3. Express metacognitive awareness of productive approaches to collaborative work

### Assignment Structure

*Phase 1:* Problem Solving (40 minutes)

*(In-class)*

*Your Problem Set:* Choose and complete ONE problem from each category below. Show all your work and save it for your portfolio submission.

*Category A:* Rational Function Analysis For your chosen function, find the domain, vertical asymptotes, horizontal asymptotes, x-intercepts, and sketch the graph.

1.  $f(x) = (2x^2 - 8)/(x^2 - 3x - 4)$
2.  $g(x) = (x^2 + x - 6)/(2x^2 - x - 3)$

*Category B:* Inverse Functions For your chosen function, find its inverse and determine the domain of both the original function and its inverse. Verify your answer by showing that  $f(f^{-1}(x)) = x$ .

1.  $f(x) = \sqrt{x + 3}$
2.  $h(x) = (2x - 1)/(x + 4)$

*(Out-of-class)*

*AI Interaction Protocol:* Now that you have made your best effort at solving the problem on your own, you will use the GenAI tool to help you identify any gaps in your understanding. It is important that you enter your initial solution, even if you are unsure or think it may be incorrect. GenAI will help you identify and understand any errors, so having your original attempt recorded is an important step in the learning process.

Then use this exact prompt with your GenAI tool:

*"I'm working on a pre-calculus problem. Please check my solution step by step. If I made an error, guide me to discover it through questions rather than giving me the answer directly. Ask me to explain my reasoning at each step where you see confusion. My problem asks me to \_\_\_\_\_ for the function \_\_\_\_\_ and here is my work [upload initial work]"*

Fill in the blanks with the complete instructions for your problem and the function that you chose. Continue this process until your solution is correct. Make sure to save the transcript of your conversation with the GenAI for your portfolio submission.

*Phase 2: Communication (Out-of-class, 20 minutes)*

*Problem-Solving Explanation:* Write a detailed explanation of your mathematical solution process. Focus on the mathematical reasoning and steps you used to solve the problem. Save your initial explanation for your portfolio submission.

*AI Critique Protocol:* Submit your explanation to GenAI with this prompt:

*"Please critique my mathematical explanation for clarity, completeness, and accuracy. Point out any gaps in my reasoning or unclear language. Ask me questions that will help me strengthen my explanation rather than rewriting it for me."*

Revise your explanation based on the GenAI feedback. Make sure to save the transcript of your conversation with the GenAI, and your revised explanation.

*Learning Process Reflection:* After completing your problem-solving explanation and revising it based on GenAI's feedback, separately address these questions. This is a personal reflection and these questions should not be entered in the GenAI, but should be submitted in your portfolio.

- Your initial approach and why you chose it
- Where you encountered difficulties
- How GenAI's questions helped you think differently
- The mathematical concepts that were crucial to solving the problem

*Phase 3: Collaborative Review (In-class, ~30 minutes)*

*Partner Exchange:*

- Share your original work, final solution, and explanation with your assigned partner
- Review their work using the same standards the GenAI used
- Provide written feedback focusing on mathematical reasoning and communication
- Discuss any insights gained from seeing their approach

*Group Discussion Questions:*

1. How did GenAI questioning compare to peer questioning in helping you learn?
2. What patterns did you notice in the types of errors the GenAI identified?
3. Which problem-solving strategies emerged as most effective?

*Phase 4: Reflection and Synthesis (In- or out-of-class, ~15 minutes)*

*Individual Reflection:* Respond to these questions and submit them in your portfolio:

1. Future Learning Strategy: Design an GenAI prompt you would use when learning a new challenging mathematical concept. Explain why this prompt would be effective based on today's experience.
2. Knowledge Prerequisites: What foundational knowledge was essential for completing this assignment successfully? How did gaps in this knowledge affect your problem-solving?  
Collaborative vs. GenAI Learning: Compare the benefits of GenAI assistance versus peer collaboration in your learning process. When would you choose each approach?

### **Portfolio Submission Requirements**

Submit a single document containing:

- Original problem work with GenAI interaction log (Phase 1)
- Final correct solutions with work shown (Phase 1)
- Initial explanation of thought process (Phase 2)
- GenAI critique of your explanation (Phase 2)
- Revised explanation responding to GenAI feedback (Phase 2)
- Learning process reflection responses (Phase 2)
- Peer review exchange (given and received) (Phase 3)
- Individual reflection responses (Phase 4)

### **Assessment Criteria**

Mathematical Accuracy (25%)

- Correct final solutions
- Valid mathematical reasoning
- Proper notation and terminology

### Communication Skills (25%)

- Clear explanation of problem-solving process
- Effective response to GenAI critique
- Constructive peer feedback

### GenAI Integration (25%)

- Appropriate use of GenAI prompts
- Meaningful engagement with GenAI feedback
- Evidence of learning from GenAI interaction

### Collaboration and Reflection (25%)

- Quality of peer review exchange
- Depth of reflection on learning process
- Insights about future learning strategies