

*For this artifact, we will be engaging in an in-class activity that will help you create the artifact. On the given day, bring in 2-3 "standard" questions that you would like to redesign through strategic questioning. When turning in your completed artifact, make sure to have the following sections filled out:*

For my questions, I chose to focus on common problems I see come up in office hours/recitations from math courses. I am hoping that the redesign/follow up questions help students to get out of the standard "procedural recall" style of math instruction. As in, I want to shift from answer-getting to meaning-making, invite multiple strategies, question assumptions and models, connect math to reality, and encourage students to play with the problem itself.

**Original Question (used in workshop):** Solve the following system of equations for  $x$  and  $y$ :

$$y = 1000 + 200x \quad (1a)$$

$$y = 400x. \quad (1b)$$

**Redesign 1:** How does the method you choose (substitution vs. elimination vs. graphing) shape what you notice? What does the solution represent geometrically? When might two systems have no solution, or infinitely many?

**Redesign 2:** What can this system represent in real life (can you come up with an example that this model could represent)?<sup>1</sup>

**Original Question:**

Evaluate the limit:

$$\lim_{x \rightarrow \infty} 2x^4 - x^2 - 8x. \quad (2)$$

**Redesign 1:** What does it mean to approach a number (or here, infinity) but not be there?

**Redesign 2:** Why do we need limits instead of just plugging in values? What happens if you try to plug  $\infty$  straight-away?

How can this be used in reality?

**Original Question (used in workshop):**

How can we live with others?

**Redesign 1:**How do our biases operate within the interaction with others, and how to avoid that?

**Redesign 2:** Have you experienced the daily, even obviously biased moments in interactions with others? And why did you feel uncomfortable? And why should we pay attention to this?

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<sup>1</sup>Example: Say you start a crochet business and it costs \$1000 for materials up front, and each blanket you make costs \$200. You choose to sell each blanket for \$400. The system (1) can represent your total cost (1a) and total revenue (1b), where  $x$  is are crocheted blankets and  $y$  is money. By finding the solution ( $x^* = 5, y^* = 2000$ ) to the system, we have identified the break-even point; i.e., you need to sell more than 5 blankets to make a profit.

**Reflection:** *From your experience, what is the purpose for developing strategic questions and what did you learn from personally engaging with your's and others' questions?*

Developing strategic questions helps guide the conversation to get to the “meat” of the matter instead of remaining superficial or procedural. Asking questions that moves beyond clinical, yes-or-non style of questions invites curiosity and participation. For my own question about a math problem, I learned that there are a lot more angles or approaches to answering the question and/or understanding the problem overall; it’s interesting because I’ve seen these types of questions asked, but they felt like “bonus” questions that you didn’t need to answer to pass the class, or showed up in YouTube videos that one would watch for fun (and weren’t mandatory). When working on redesigning my partner’s questions, I got practice trying to frame questions to elicit certain topics to be discussed. When Xiaodong shared the original question, he explained that he really wants the students to consider how our own personal biases and stereotypes imposed by society influence how we interact with others. So, we worked on trying to incorporate these topics into the redesigns.