

INTRODUCTION TO CALCULUS

MATH 1A

UNIT 15: WORKSHEET

Exactly 20 years after the iconic "Mean girls" movie with Lindsay Lohan as the high school student, another "Mean girls" movie has hit the theaters. The story is closer to a musical but very similar to the original movie. Even the limit question is the same! Here is the original question

Problem 1: Find the limit

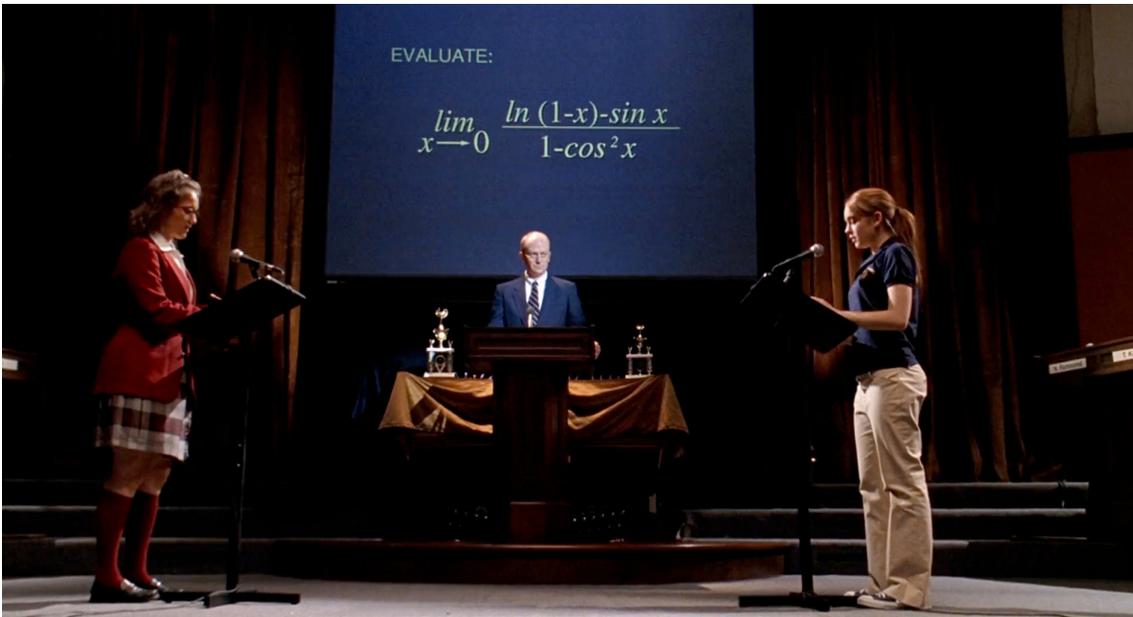
$$\lim_{x \rightarrow 0} \frac{\ln(1-x) - \sin(x)}{1 - \cos^2(x)}.$$

As a director of the movie, I might actually have changed the limit a bit and made it more interesting. Can you solve the following limit problem?

Problem 2: Find the limit

$$\lim_{x \rightarrow 0} \frac{\ln(1-x) + \sin(x)}{1 - \cos^2(x)}.$$

Problem 3: In the movie, the contestants did not have access to paper or pencil and had to do things in their head. Can you imagine a strategy which without Hospital could solve both problems faster? There is a strategy (at least in 1).



From the original "Mean Girls 2004" movie. The 2024 movie borrowed the same slide.

Single Variable Calculus



From the original Mean Girls 2004 movie. On the board, you see a topic we cover next week in this class.



From the new "Mean Girls 2024" movie. Tina Fey is again the math teacher. The board shows a "healing limit problem" and a problem, where no healing is necessary.

OLIVER KNILL, KNILL@MATH.HARVARD.EDU, MATH 1A, SPRING, 2024