

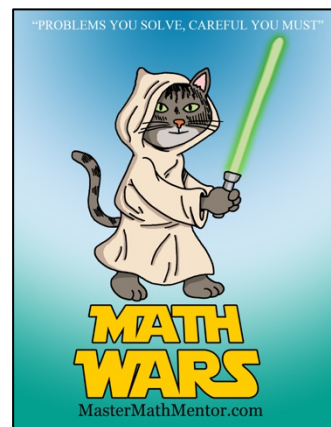
Math Wars – AB Calculus

Scrambled 156 – Limits & Derivatives



Maximum Time: 7.5 Minutes

Directions: To start, you need to download the Math Wars application on your cell phone: Use the QR code or the url: <https://mastermathmentor.com/mmm/mathwars.ashx?key=156>



When ready, start the timer and then solve the problems below, entering your choice, A, B, C, D and pressing for each problem when you are sure of your answer. When complete, stop the timer. You will see problems you got correct in green and incorrect in red. You will receive a score based on how many problems you got right and your time. A perfect score is all problems correct using half the maximum time or less. You can text or email your friends with your results.

1. (1 pt) The current amount of water H in Lake Mead is decreasing at a faster rate than it was previously. Which statement is true?

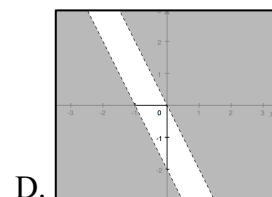
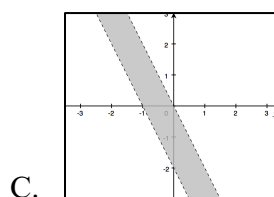
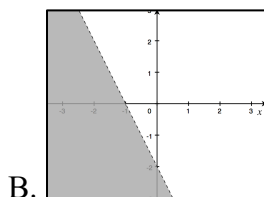
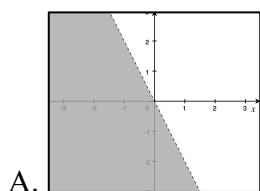
A. $\frac{dH}{dt} > 0, \frac{d^2H}{dt^2} > 0$ B. $\frac{dH}{dt} > 0, \frac{d^2H}{dt^2} < 0$ C. $\frac{dH}{dt} < 0, \frac{d^2H}{dt^2} > 0$ D. $\frac{dH}{dt} < 0, \frac{d^2H}{dt^2} < 0$

2. (3 pts) For how many of the following curves can $\frac{dy}{dx}$ not easily be found explicitly?

I. $xy - y = 5$ II. $x + \sqrt{xy} = 4$ III. $y + \cos y = x$ IV. $x^2 - y^2 = x + 1$

A. 1 B. 2 C. 3 D. 4

3. (5 pts) Let $f(x)$ be a function such that $\frac{dy}{dx} = 2x + y$. Which of the shaded regions in the graphs below describe the set of points for which $f(x)$ is decreasing and concave up?



4. (7 pts) Find the difference between the largest and smallest slope to $f(x) = 40x^3 - 3x^5$

A. 2 B. $2\sqrt{2}$ C. 240 D. $256\sqrt{2}$

5. (9 pts) Find $\lim_{x \rightarrow 0} \left(\frac{\sqrt{x+16} - 4}{4x} \right)$

A. 0 B. $\frac{1}{4}$ C. $\frac{1}{16}$ D. $\frac{1}{32}$