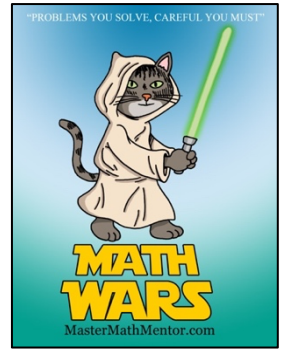


Math Wars – AB Calculus

Topic 117 – Second Derivative Test

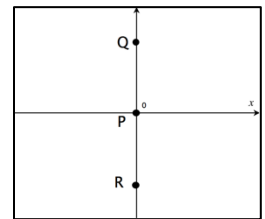


Maximum Time: 8.75 Minutes

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=117>

When ready, start the timer and then solve the problems below, entering your choice, A, B, C, D and pressing **Submit** 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 graph of differentiable function $f(x)$ has a relative minimum at $x = 0$. The graph to the right shows three points, P, Q and R. $f(0)$, $f'(0)$ and $f''(0)$ are located at these points. Which of the following must be true?

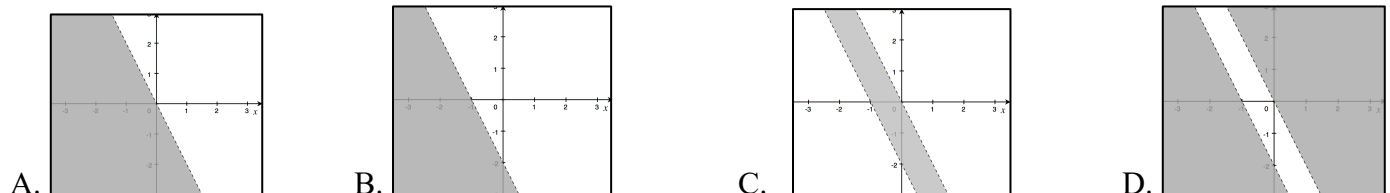


- | | | | |
|----------------|----------------|----------------|----------------|
| $f(0) = R$ | $f(0)$ unknown | $f(0) = R$ | $f(0)$ unknown |
| A. $f'(0) = P$ | B. $f'(0) = P$ | C. $f'(0) = Q$ | D. $f'(0) = Q$ |
| $f''(0) = Q$ | $f''(0) = Q$ | $f''(0) = P$ | $f''(0) = P$ |

2. (3 pts) Let $f(x)$ be a function such that $\frac{dy}{dx} = 4x^2 - 2e^{2y} + 7x$. If $f(x)$ passes through the point $(-2, 0)$, characterize the point $(-2, 0)$.

- A. relative maximum B. relative minimum C. inflection point D. none of these

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) Let $f(x) = \sin^2 x - x^2$. Which of the following statements are true about f when $x = 0$?

- I. The second derivative test is conclusive
- II. f has a relative maximum
- III. f has a relative minimum

A. II only

B. III only

C. I and II only

D. I and III only

5. (9 pts) Let $f(x)$ be a function such that $\frac{dy}{dx} = 2x - y$. Which of the following statements is true?

- I. It is possible for f to have a relative minimum
- II. It is possible for f to have a relative maximum
- III. It is possible for f to have an inflection point

A. I only

B. II only

C. III only

D. None of these