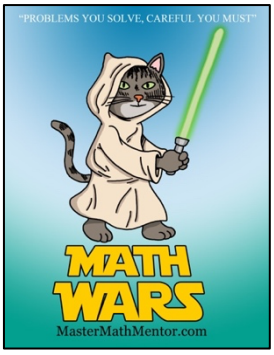
Math Wars – AB Calculus
Topic 114 – Three Important Theorems



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=114

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) Let f be a continuous function on the interval [–4, 5]. If $f(-4)=6$ and $f(5)=-3,$ then the Intermediate Value Theorem guarantees that

A. $f(0)=0$ B. $f'(c)=-1$ for at least one c on $[-4,5]$ C. $-3\le f(c)\le 6$ on all c on $[-4,5]$ D. $f(c)=4$ for at least one c on $[-4,5]$

2. (3 pts) Let $f(x)=(x^2-16)(x^2-4)$. At how many value of c does Rolle's Theorem hold on [–4, 2] ?

A. 3 B. 2 C. 1 D. 0

3. (5 pts) Let $f(x)=6+\sqrt{x}$. Find the value of c that that satisfies the Mean-Value Theorem for f on [0, 9].

A. $\sqrt{\frac{2}{3}}$ B. $\sqrt{\frac{3}{2}}$ C. $\frac{9}{4}$ D. 1

4. (7 pts) Let $f(x)=\sin 2x+\cos 2x$. Find the value(s) of c that that satisfies the Mean-Value Theorem for f on $[0,\pi]$.

A. $\frac{\pi}{8}$ only B. $\frac{\pi}{8}$ and $\frac{5\pi}{8}$ only C. $\frac{\pi}{4}$ only D. $\frac{\pi}{4}$ and $\frac{3\pi}{4}$ only

5. (9 pts) Suppose $f(x)$ is differentiable at all values of x and $f(-a)=5$ and $f'(x)\le -2$ for all values of x. Using the Mean-Value Theorem, what is the largest possible value of $f(a)$?

A. $5-4a$ B. $5-2a$ C. $10-a$ D. $-10-2a$