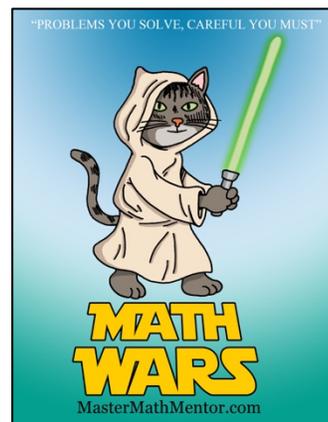# Math Wars – AB Calculus
Scrambled 163 – Limits & Derivatives

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=163

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) If $a \neq 0$ and $a \neq 1$ and $\lim_{x \to n}\left(a^x\right) = 1$, then $n =$

   A. 0
   B. 1
   C. either 0 or 1
   D. dependent on value of a

2. (3 pts) A cylindrical mold of rubber is 5 inches high with a diameter of 10 inches. It is placed under a hydraulic press. Since it is rubber, it compresses and while the radius does not change, the volume decreases by 80 in³/sec. Which is closest to how fast the height of the mold decreases during the time it compresses?

   A. $0.2 \text{ in}^3/\text{sec}$
   B. $1 \text{ in}^3/\text{sec}$
   C. $\pi \text{ in}^3/\text{sec}$
   D. $5 \text{ in}^3/\text{sec}$

3. (5 pts) Let $f(x) = x^{2p} + x^{2q} + x^{2r}$ where p, q, and r are positive integers. Which of the following is true if $x < 0$?

   I. $f(x)$ is decreasing
   II. $f'(x)$ is decreasing
   III. $f''(x)$ is decreasing

   A. II only
   B. I and II only
   C. I and III only
   D. II and III only

4. (7 pts) Using the table to the right, find $\left(f^{-1}\right)'(2) + \left(f^{-1}\right)'(-2)$

   A. $\dfrac{-1}{3}$
   B. 4
   C. -3
   D. 0

x	$f(x)$	$f'(x)$
-2	-4	2
0	-2	$-1/2$
2	4	-2
4	2	$1/6$

5. (9 pts) If $f(x) = \left(x^2 - 4x + 6\right)^2$, find $f''(2)$

   A. 0
   B. 8
   C. 40
   D. 72