

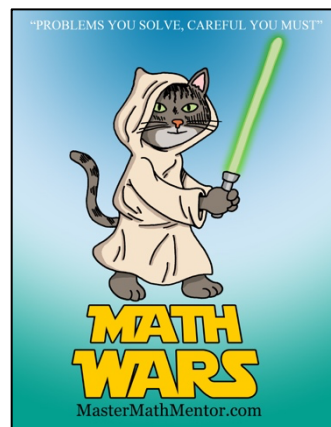
# Math Wars – BC Calculus

## Scrambled # 261



**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=261>



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) Let  $f$  be a function having derivatives for all orders of real numbers. The function and its first three derivatives at  $x = 3$  are given in the table below. The fourth derivative of  $f$  satisfies the inequality  $|f^{(4)}(x)| \leq 80$  for all  $x$  in the interval  $[3, 5]$ . Find an expression representing the Lagrange Error.

$x$	$f(x)$	$f'(x)$	$f''(x)$	$f'''(x)$
3	2	-3	0	-4

- A.  $\frac{(x-3)^4}{80}$       B.  $20(x-3)^4$       C.  $\frac{10(x-3)^4}{3}$       D.  $80(x-3)^4$
2. (3 pts) A particle moving along a curve in the  $xy$ -plane has position  $(x(t), y(t))$  at time  $t > 0$ . The velocity of the particle is  $\mathbf{v}(t) = \left\langle 1 + \frac{1}{t}, 4 - \frac{2}{t} \right\rangle$ . For what time  $t > 0$  does the line tangent to the path of the particle at  $(x(t), y(t))$  have a slope of  $\frac{2}{3}$ ?
- A.  $\frac{4}{5}$       B. 1      C.  $\frac{7}{5}$       D.  $\frac{3}{2}$
3. (5 pts)  $\int \sin x \cos x \, dx$  is to be found.  $U$ -substitution and integration by parts are attempted. Which methods can be used?
- A. Both methods      B. Only  $u$ -substitution      C. Only integration by parts      D. Neither
4. (7 pts) What is the best integer approximation to  $\frac{400}{499} + \frac{404}{504} + \frac{408}{509} + \frac{412}{514} + \dots + \frac{4000}{4999}$ ?
- A. 721      B. 800      C. 811      D. 832

5. (9 pts) On December 31, Derek makes a resolution to go on a big diet. On January 1, he has already lost 1 pound. The number of pounds  $P$  he loses is approximated by the differential equation  $\frac{dP}{dt} = 0.03P(40 - P)$  where  $t$  is measured in weeks. Approximately what day is he losing weight the quickest if Euler's method with step 1 is used to approximate the solution to the DEQ?

A. January 22

B. January 29

C. February 1

D. February 15