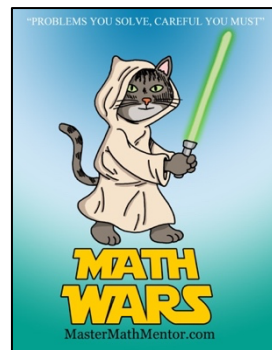


# Math Wars – BC Calculus

## Topic 207 – Arc Length



**Maximum Time: 8.25 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.aspx?key=207>

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 expression that represents the arc length of  $y = \ln x$  from  $x = 1$  to  $x = e$  is given by

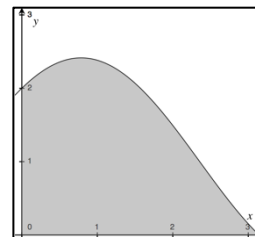
A.  $L = \int_1^e \left(1 + \frac{1}{x}\right)^2 dx$       B.  $L = \int_1^e \left(1 + \frac{1}{\sqrt{x}}\right) dx$       C.  $L = \int_1^e \sqrt{1 + \frac{1}{x}} dx$       D.  $L = \int_1^e \sqrt{1 + \frac{1}{x^2}} dx$

2. (3 pts) Which of the following curves have the same arc length as  $y = x^2$  on  $[-2, 2]$ ?

I.  $y = x^2 - 1$       II.  $y = |x^2 - 1|$       III.  $y = x^2 - 2x + 1$

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

3. (5 pts) (Calculator Active). Find the perimeter of shaded region bordered by  $f(x) = \sin x + \cos x + 1$ ,  $x = 0$ ,  $x = \pi$  and the  $x$ -axis as shown in the figure.



A. 4.442      B. 5.368  
C. 8.584      D. 9.510

4. (7 pts) Find the arc length of  $y = \sqrt{4 - x^2}$  from  $x = 0$  to  $x = 2$ .

A.  $\frac{1}{2}$       B.  $\pi$       C.  $2\pi$       D. 4

5. (9 pts) The length of a curve from  $x = 1$  to  $x = 5$  is given by  $L = \int_1^5 \frac{\sqrt{4 + 9x^4}}{2} dx$ . If the curve passes through the point  $(2, 10)$ , which of the following could be the equation for this curve?

I.  $y = \frac{x^3}{2} + 6$       II.  $y = 14 - \frac{x^3}{2}$       III.  $y = \frac{3x^2}{2} + 4$       IV.  $y = 16 - \frac{3x^2}{2}$

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