DIGITLE – BC CALCULUS
Puzzle 205 – Arc Length

Directions: The first 5 problems have single digit or letter answers. The 6th problem has a 3-digit answer (counting leading zeros if present). You have a choice: solve the easier single-character answer problems or tackle the more difficult 3-digit answer and the multiple choice. Once you have done that, attempt to solve the puzzle by entering the following url on your computer, tablet, or phone: https://mastermathmentor.com/mmm/digitle.ashx. The correct puzzle answer will be the digits/letters of your answer(s) scrambled. Use the following interpretation. You get 6 tries. Problems should be done without graphing calculators.

Green : the digit is in the answer and is in the correct spot.   Grey : the digit is not in the answer.
Yellow: the digit is in the answer but is not in the correct spot.

1) (Calculator) Find the length of the arc for $f(x) = 3x^2$ on [0, 1] to the nearest integer.

2) (Calculator) Find the perimeter to the nearest integer of Region R whose region is bordered by $f(x) = 4\sin x \cos x + 1$, $x = 0$, $x = \pi/2$ and the x-axis as shown in the figure to the right.
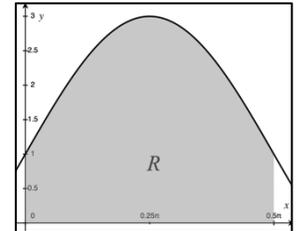
3) Which of the following curves have the same arc length on $[0, 2\pi]$?

   I. $y = \sin x \cos x$ II. $y = |\sin x \cos x|$ III. $y = 1 - \sin x \cos x$

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

4) Find the length of the arc for $f(x) = 4x^{3/2}$ on [0, 1] to the nearest integer.

5) (Calculator) The arc length of a sine curve with amplitude 3 is approximately what percent larger than the arc length of a sine curve with amplitude 1, both over the interval $[0, 2\pi]$?

   A. 33.3%   B. 45.3%   C. 54.7%   D. 82.9%

Three Digit Answer:

6) (Calculator) A roof on a shed has a cross section as the parabola $f(x) = 25 - \dfrac{x^2}{4}$ where x is measured in feet and length 15 ft. as shown in the figure to the right. What is the area of the roof to the nearest integer?