

DIGITLE – AB CALCULUS

Puzzle 122 – Riemann Sums



Directions: The first 5 problems have single digit answers. The 6th problem has a 5-digit answer (counting leading zeros if present). You have a choice: solve the easier single-digit answer problems or tackle the more difficult 5-digit answer. 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>.

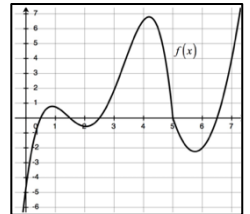
The correct puzzle answer will be the digits of your answer(s) scrambled. Use the following interpretation. You get 6 tries.

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

Grey : the digit is not in the answer.

Single Digit Answers:

1) The graph of $f(x)$ is shown to the right. Find the difference in the Riemann sum calculations for $\int_0^7 f(x) dx$ if both left and right equal-length rectangles, are used.



2) A function $r(x)$ passes through the points as shown in the table to the right. A midpoint approximation to $\int_1^{11} r(x) dx$ is calculated in as many

x	1	2	3	5	6	7	8	11
$r(x)$	2	1	$\frac{1}{8}$	0	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{3}$	1

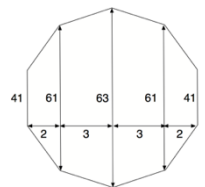
ways as possible given this information. What is the largest possible approximation?

3) The function f is continuous on the closed interval $[-5, 5]$ and has the values given in the table. The trapezoidal approximation for $\int_{-5}^5 f(x) dx$,

x	-5	-3	0	2	5
$f(x)$	6	k^2	k	$-2k$	-10

found with 4 subintervals, is $2k$. What is the largest value of k satisfying this relationship?

4) A contractor is laying a colorful tile insert in the shape of a regular decagon. He uses 2 and 3-inch tile widths with the given dimensions in inches of the trapezoidal pieces to complete the decagon as shown to the right. What is the amount of tile needed in square feet?



5) The function f is continuous on the closed interval $[-6, 10]$ and has the values in the table to the right. The function is constructed such that the trapezoidal approximation with 5 trapezoids is between 0 and 20 inclusive. What is the difference between the maximum and minimum values of k ?

x	-6	-2	2	6	10
$f(x)$	4	6	k	-8	4

5-Digit Answer:

6) The exact value of $\int_1^2 \frac{50000}{x} dx = 50000 \ln 2$. If this integral is calculated with a left, a right, and a midpoint Riemann Sum, each with 5 rectangles of equal width, and 5 trapezoids of equal width, what is the calculation to the nearest integer that comes closest to the exact value?