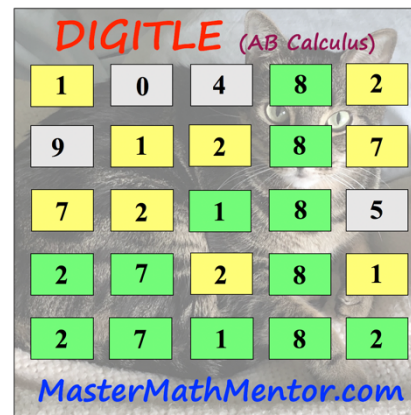


DIGITLE – AB CALCULUS

Puzzle 101 – Rates of Change



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.

Grey :

the digit is not in the answer.

Yellow:

the digit is in the answer but is not in the correct spot.

Single Digit Answers:

1) Find the average rate of change of $f(x) = 12 \sin \frac{\pi x}{2} - 12 \cos \left[\frac{\pi(x-1)}{4} \right]$ from $x = 1$ to $x = 5$.

2) The velocity of a car moving along a highway is modeled by the function v , where the position v is measured in feet per second and time t is measured in seconds. The value of v is given at selected values of time. If the best possible approximations of $a(20)$ all yield the same value, what is the value of k ?

t	0	8	16	20	25	30
$v(t)$	3	15	$3k + 7$	$6k - 2$	$10k - 15$	60

3) The function $f(x) = x^3 - kx^2 + 3$ has the average rate of change of f over the interval $[0, 2]$ the same as the average rate of change of f over the interval $[-1, 0]$. Find the value of k .

4) If a particle travels in a straight line with distance s given by $s(t) = 80 + 2t - t^2$, find the difference between the average velocity between $t = 0$ and $t = 10$ and the instantaneous velocity at $t = 5$.

5) The number of houses sold by a real estate company per month is approximated by the function

$h(t) = 21 \left(9 - \frac{8}{t+2} \right)$ where t is measured in months from the beginning of the year. What is the average number of houses sold by the company from January 1 through October 31?

5-Digit Answer:

6) For the function $f(x) = \frac{-123456}{x+1}$, find the instantaneous rate of change of f at $x = 3$.