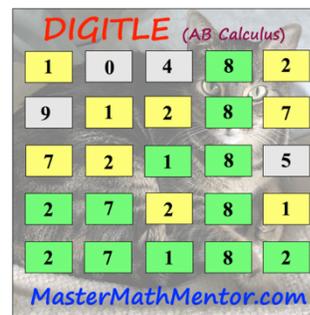


DIGITLE – AB CALCULUS

Puzzle 126 – Average Value



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) Suppose $\int_0^a f(x) dx = k$, where a is a non-zero real number. The average value of $f(x)$ on $[-a, a] = mk$. If

$f(x)$ is an odd function, find the value of m .

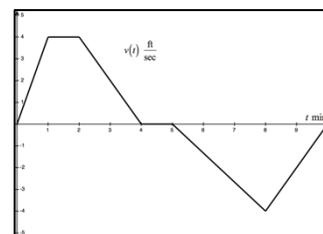
2) A monsoon hits a remote jungle in Honduras. The rate of rainfall is given by the function $R(t)$ and is shown by the table to the right at various values of t where t is given in minutes and $R(t)$ is given in inches per hour. Find the average amount of rain that fell over the 30-minute period in inches per hour as calculated by a trapezoidal rule using $\Delta t = 5$ minutes. Answer in inches per hour.

t (min)	0	5	10	15	20	25	30
$R(t)$ (inches/hr)	0.25	0.60	0.90	1.50	1.65	1.00	0.25

3) Let $f(x) = x^4$. For what value of b does the average value of $f(x)$ on the interval $[0, b]$ equal the average rate of change of f on $[0, b]$?

4) A particle moves along a straight line with velocity $v(t) = 2(t \sin t)^2$. The average acceleration of the particle from $t = \pi/2$ to $t = 3\pi/2$ and be expressed as $k\pi$. Find the value of k .

5) A company is experimenting with a jet-pack. Someone wearing the jet pack can control their speed vertically. A person wearing one has velocity $v(t)$ is shown on the figure to the right, where t is measured in minutes and $v(t)$ is measured in ft/sec. He is initially 100 feet above sea level and lands exactly where he began. What is the person's average speed over the 10-minute period?



5-Digit Answer:

6) (Calculator active – set calculator to 4 decimal place accuracy) A glass blower works with glass at extremely high temperatures as glass melts at temperatures around $2,600^\circ F$. To shape glass, it has to be brought up to high temperatures and then be allowed to cool slightly. Suppose a glass blower is working with glass whose temperature is given by $R(t) = (30 - 6t) \sin^2\left(\frac{\pi t}{3}\right) + 2.3t + 7.4$ where R is measured in hundreds of degree

Fahrenheit and t is measured in minutes. When the temperature of the glass is greater than $1,500^\circ F$, an alarm goes off and the glass blower must wear a special set of protective eyewear. If the glass blower shapes the glass for 7 minutes, find the average temperature when the glass blower must be using the eyewear.