DIGITLE – AB CALCULUS
Puzzle 130 – Integration Applications

https://mastermathmentor.com/mmm/digitle.ashx.

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) Painters are painting equal-sized rooms in an office building. The foreman starts painting at 8 AM with additional painters showing up after that. If $1\frac{1}{3}$ rooms are complete by 9 AM, how many rooms are completely painted when they break for lunch at 12 noon if they paint at the rate of $2 - 2\big/(t+2)^2$ rooms per hour, where t is time in hours after 8 AM?

2) A company is treating their employees to hoagie lunches. The company contacts two Hoagie shops, Guido's and Lou's, who start making the hoagies the day before. Lou's makes 125 hoagies and Guido's makes 96 hoagies. The next day, they come in at 7 AM and make more hoagies until 11 AM. The rate that they create the hoagies is shown in the graph to the right. If the shaded region is 34, what is the difference between the total number of hoagies that Guido's and Lou's made?
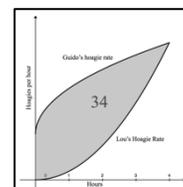
3) In a post office, the rate that customers enter the service line is given by $e(t)$ and the rate that people are waited on is given by $w(t)$. The values of e and w are given at selected times where t is measured in minutes. There are 5 people initially in line. If $L(t)$ represents the number of people in line, find the value of $L'(6)$.

t	0	3	6	10	15
$e(t)$	3	4	5	4	6
$w(t)$	0	2	3	5	1

4) (Calculator) Fiddler's Roofing company installs roof on condo buildings. The rate they install roofs is given by the function $s(t) = 2 - 1.6\sin(\pi t/7)$ where t is measured in months and $s(t)$ is measured in roofs per month. If the beginning of January corresponds to $t = 0$, the beginning of February corresponds to $t = 1$, and the end of December corresponds to $t = 12$, find the difference in the number of roofs they install between the 2nd quarter of the year and the 3rd quarter. Round to the nearest integer.

5) (Calculator) The rate of change of the number of vehicles crossing a toll bridge is given by $B(t)$ where t is measured in vehicles and $W(t)$ is measured in vehicles/minute. The values of $B(t)$ are given over a 45-minute period as shown by the table to the right. If $B(t)$ is modeled by $B(t) = 0.01(t^3 - 60t^2 + 900t + 120)$, estimate the integer difference between the estimations of vehicles crossing the bridge using the model and a trapezoid rule with 5 trapezoids.

t	0	10	20	30	40	45
$B(t)$	−2	46	20	−2	42	100

5-Digit Answer:

6) On a cruise ship, there are multiple restaurants and dining rooms, but kitchen utensils are all washed and stored in drawers in the same location. At the start of the 5-hour time period when dinner is served, there are 22,275 utensils in the drawers. The rate that utensils are being used is 20,000 per hour. The rate that the utensils are washed and returned to storage is given by $W(t)$ as shown in the figure to the right. What is the maximum number of utensils that are available for use during the 5-hour time period?