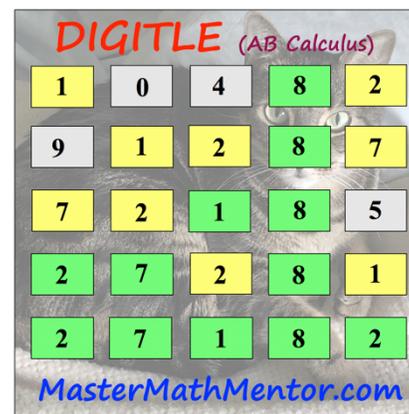


# DIGITLE – AB CALCULUS

## Puzzle 121 – The Accumulation Function



**Directions:** The first 5 problems have single digit answers. The 6<sup>th</sup> 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.

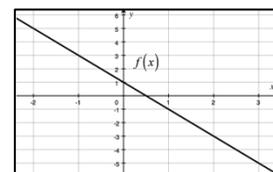
**Yellow:** the digit is in the answer but is not in the correct spot.

**Grey :** the digit is not in the answer.

### Single Digit Answers:

- 1) The graph of the linear function  $f$  is shown to the right. Let  $g$  be defined by

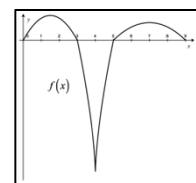
$$g(x) = \int_{-1}^x f(t) dt. \text{ Find the value of } |g(3) - g(-2)|.$$



- 2) The graph of the function  $f$  is shown to the right. Let  $g$  be the continuous function defined

$$\text{by } g(x) = \int_0^x f(t) dt. \text{ If } a \text{ is the value of } x \text{ where } g \text{ has its absolute minimum and } b \text{ is the}$$

value of  $x$  where  $g$  has its absolute maximum, find the value of  $a - b$ .



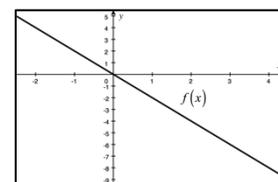
- 3) The functions  $f$  and  $g$  are differentiable for all real numbers. The table below gives the values of the functions and their first derivatives at selected values of

$$x. \text{ Let } h \text{ be the function given by } h(x) = \int_{-1}^{g(x)} f(t) dt. \text{ Find the value of } h'(1).$$

$x$	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
-1	2	-2	0	2
0	-3	-1	-2	-3
1	2	3	-1	4

- 4) The graph of the linear function  $f$  is shown in the figure to the right. If

$$g(x) = \int_{-1}^x f(t) dt, \text{ find the value of } g'(3) - g(3).$$



- 5) Let  $f$  be given by  $f(x) = \int_0^x \sqrt[3]{t^2 - 10t + 24} dt$ . For what value of  $x$  does  $f$  have an inflection point?

### 5-Digit Answer:

- 6) At the end of a tour, guests are invited to take a model Porsche at its factory. During that time, the toy cars come off the assembly line and fall into a basket at the rate of 10 per minute, shown by the dashed line in the figure to the right. Let  $R(t)$  represent the rate, measured in toy cars/min, that the guests take cars from the basket, shown by the piecewise graph. Suppose at the start of the 100-minute period, there were 185 toy cars in the basket. First find the number of minutes elapsed when there is a maximum number of cars in the basket. Second, find this maximum number of cars. For instance, if you think the maximum number of cars was 75 after 40 min., your 5-digit answer is 40075. If you think the maximum number of cars was 250 after 100 min., use 99250.

