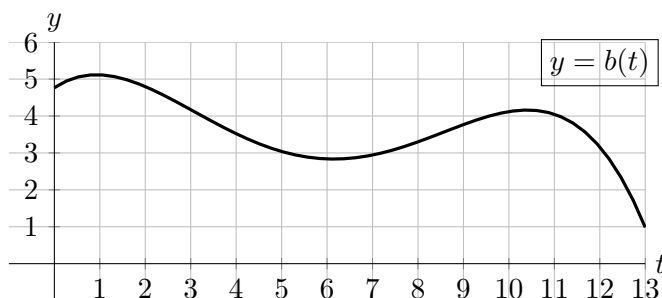


8. [7 points] Ben buys cabbage for his juice business. Let  $b(t)$  be the rate at which Ben buys cabbage, in pounds per month, for his business  $t$  months after the beginning of 2015. The graph of  $b(t)$  is shown below.



- a. [3 points] Ben already has bought 100 lbs of cabbage at the beginning of 2015. Write a mathematical expression involving the function  $b$ , its derivative and/or a definite integral that represents the total number of pounds of cabbage Ben bought by the end of 2015.

*Solution:*

$$\text{Answer: } 100 + \int_0^{12} b(t) dt$$

- b. [2 points] Let  $A(t)$  be the amount of cabbage, in pounds, Ben has bought during the first  $t$  months of 2015. Suppose  $A(5) = 120$ . Find a formula for the tangent line approximation  $L(t)$  of  $A(t)$  near  $t = 5$ .

*Solution:*

$$L(t) = 120 + 3(t - 5)$$

- c. [2 points] Which of the following must be true? Circle your answer.

*Solution:*

$$L(4.5) < A(4.5) \quad \boxed{L(4.5) > A(4.5)} \quad L(4.5) = A(4.5) \quad \text{NOT ENOUGH INFORMATION}$$