$$Q(t) = \frac{4(a-t)^2(bt-2)^2}{(3t^2+7t+10)(4-t)(-2t+c)}$$

where a, b, and c are positive constants. What happens to the amount of waste in the long run? Circle the correct answer and fill in the blank if necessary. Your answer may include the constants a, b or c.

- i) It increases without limit.
- ii) It approaches zero.

iii) It approaches a positive limit with value L where  $L = \_$ 

- iv) None of these.
- 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 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.

## Answer: \_

**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.

$$L(t) =$$

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

L(4.5) < A(4.5) L(4.5) > A(4.5) L(4.5) = A(4.5) Not enough information