

## 8. [10 points]

- a. [4 points] A corporation owns two factories that produce light bulbs. The factories are located in Ann Arbor and Detroit. On one particular day, both factories begin producing light bulbs at 6 am. Let  $a(t)$  be the total amount of light bulbs that the factory in Ann Arbor produced that day,  $t$  hours after 6 am. Find a formula for the following functions in terms of transformations to the function  $a(t)$ .

- i) Let  $g(t)$  be the total amount of light bulbs produced by the factory in Ann Arbor so far that day,  $t$  hours after **9 am**.

$$\boxed{\text{Solution: } g(t) = a(t + 3)}$$

- ii) The factory in Detroit is larger and produces double the amount of light bulbs than the factory in Ann Arbor three times faster. Let  $d(t)$  be the total amount of light bulbs produced by the factory in Detroit so far that day,  $t$  hours after 6 am.

$$\boxed{\text{Solution: } d(t) = 2a(3t)}$$

- b. [6 points] A company sells bread to a small city. The company can produce  $L(w)$  loaves of bread in a month with  $w$  kilograms of wheat. Let  $p_0$  be the average amount of wheat (in kilograms) that the company uses each month and  $q_0$  be the average amount of loaves the company produces monthly. Answer the following questions, the function  $L$  and the constants  $p_0$  and  $q_0$  may appear in your answers.

- i) This month, the company used half the average amount of wheat for their monthly production of bread, hence it will produce \_\_\_\_\_ loaves of bread.

$$\boxed{\text{Solution: Answer: } L(\frac{1}{2}p_0)}.$$

- ii) Find an equation expressing the following fact: If the company uses 100 kilograms more than the average amount of wheat for their monthly production of bread, then it will produce 12% more than their average monthly production of bread.

Equation: \_\_\_\_\_

$$\boxed{\text{Solution: } L(p_0 + 100) = 1.12q_0}.$$