

7. [8 points] An environmental impact study has determined that most of the pollution in the air in a small town is produced by automobile exhaust. Let $P(c)$ be the level of carbon monoxide in the air (in mg per m^3) produced by c cars in this town in a day. Assume that $P(c)$ is invertible. Let $A(t)$ be the number of cars in the town, t days after January 1st, 2013 in the town.
- a. [2 points] What is the practical interpretation of the vertical intercept of the function $y = A(t)$? Use a complete sentence and include units.

Solution: The vertical intercept is the number of cars in the town on January 1st, 2013.

- b. [2 points] Write down a practical interpretation for the equation $P(A(2)) = 1$. Use a complete sentence and include units.

Solution: On January 3, 2013, the level of carbon monoxide in the air is 1 mg per m^3 .

- c. [2 points] Write an expression for the number of cars that produce a level of carbon monoxide in the air of 10 mg per m^3 in a day in this town.

Solution: $P^{-1}(10)$.

- d. [2 points] Let c_0 be the number of cars in the town during Thanksgiving day and p_0 be the average level of carbon monoxide in the air (in mg per m^3) during the year 2013. Write an equation that states the following fact:

The level of pollution in the town (in mg per m^3) during Thanksgiving day was exactly 20% higher than the average level of carbon monoxide in the air (in mg per m^3) during the year 2013.

Solution: $P(c_0) = 1.2p_0$.