7. [12 points]
The annual number of respiratory infections in a city is a function of the amount of carbon in the atmosphere above that city.

Let $R(p)$ be the annual number of respiratory infections in Ann Arbor when there are p thousand tons of carbon in the atmosphere above the city.

Let $C(k)$ be the healthcare cost, in thousands of dollars, of treating k respiratory infections.

The functions $R(p)$ and $C(k)$ are differentiable and invertible.

a. [3 points] Give a practical interpretation of the equation $R^{-1}(212) = 24$.

Solution: There are 212 respiratory infections annually in Ann Arbor when there are 24 thousand tons of carbon in the atmosphere above the city.

b. [3 points] Give a practical interpretation of the equation $C(R(17)) = 650$.

Solution: When there are 17 thousand tons of carbon in the atmosphere above Ann Arbor, the resulting annual healthcare cost for respiratory infections in Ann Arbor is 650 thousand dollars.

c. [3 points] Write a mathematical equation that represents the following statement:

The healthcare cost of treating 165 respiratory infections is 400 thousand dollars more than the healthcare cost of treating 130 respiratory infections.

Answer: $C(165) = 400 + C(130)$

d. [3 points] Complete the following sentence using the fact that $R'(38) = 4$:

If the amount of carbon in the atmosphere above Ann Arbor is reduced from 41 *thousand tons to* 38 *thousand tons, . . .*

Solution: then the annual number of respiratory infections in Ann Arbor will decrease by approximately 12.

