Exercise 21

A town's population increases at a constant rate. In 2010 the population was 65,000. By 2012 the population had increased to 90,000. Assuming this trend continues, predict the population in 2018.

Solution

Because the town's population increases at a constant rate, a linear function can be used to model the population. Let t be the number of years after 2010. Then two points on the line are $(0, 65\,000)$ and $(2, 90\,000)$. Find the slope of the line.

$$m = \frac{y_2 - y_1}{t_2 - t_1} = \frac{90\,000 - 65\,000}{2 - 0} = \frac{25\,000}{2} = 12\,500$$

Then use the point-slope formula with either of the points to get the equation of the line.

$$y - 65\,000 = 12\,500(t - 0)$$

$$y - 65\,000 = 12\,500t$$

$$y = 12\,500t + 65\,000$$

The population at the start of 2018 is found by plugging in $t = 8$.

$$y = 12\,500(8) + 65\,000 = 165\,000$$