

Exercise 45

In 2004, a school population was 1,001. By 2008 the population had grown to 1,697. Assume the population is changing linearly.

- How much did the population grow between the year 2004 and 2008?
- How long did it take the population to grow from 1,001 students to 1,697 students?
- What is the average population growth per year?
- What was the population in the year 2000?
- Find an equation for the population, P , of the school t years after 2000.
- Using your equation, predict the population of the school in 2011.

Solution

The population grew by $1697 - 1001 = 696$ between 2004 and 2008, a time interval of four years. The average population growth per year is the slope,

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1697 - 1001}{2008 - 2004} = \frac{696}{4} = 174.$$

In order to predict the population in 2000 and 2011, an equation of a line is needed. Let t be the number of years after 2000, and use the two points, $(4, 1001)$ and $(8, 1697)$. Use the point-slope formula with either of these points to get the equation of the line.

$$y - 1001 = 174(t - 4)$$

$$y - 1001 = 174t - 696$$

$$y = 174t + 305$$

To get the population in 2000, plug in $t = 0$.

$$y = 174(0) + 305 = 305$$

To get the population in 2011, plug in $t = 11$.

$$y = 174(11) + 305 = 2219$$