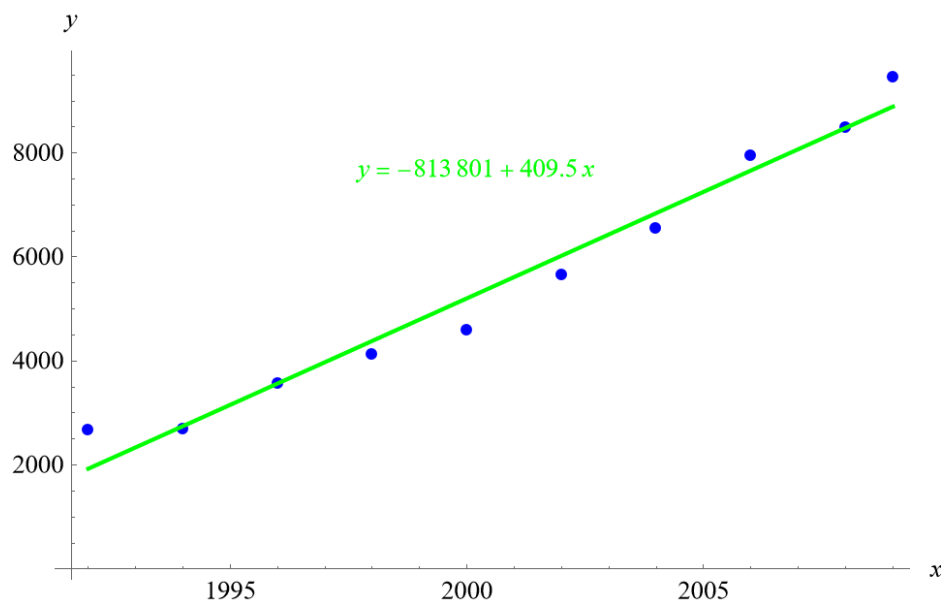## Exercise 23

The U.S. import of wine (in hectoliters) for several years is given in Table 5. Determine whether the trend appears linear. If so, and assuming the trend continues, in what year will imports exceed 12,000 hectoliters?

Year	Imports
1992	2665
1994	2688
1996	3565
1998	4129
2000	4584
2002	5655
2004	6549
2006	7950
2008	8487
2009	9462

Table 5

Solution

Plot the following points on a graph: $(1992, 2665)$, $(1994, 2688)$, $(1996, 3565)$, $(1998, 4129)$, $(2000, 4584)$, $(2002, 5655)$, $(2004, 6549)$, $(2006, 7950)$, $(2008, 8487)$, and $(2009, 9462)$.

$$y = -813\,801 + 409.5\,x$$

The trend does appear linear. Mathematica's FindFit function gives

$$y = -813\,801 + 409.5x$$

as the line that best fits the data. Find when the imports exceed 12,000 by solving the following inequality.

$$y > 12\,000$$

$$-813\,801 + 409.5x > 12\,000$$

$$409.5x > 12\,000 + 813\,801$$

$$409.5x > 825\,801$$

$$x > \frac{825\,801}{0.47606} \approx 2016.61$$

Therefore, after the middle of 2016 imports will exceed 12,000 hectoliters.