## Exercise 42

For the following exercises, consider this scenario: The profit of a company decreased steadily over a ten-year span. The following ordered pairs show dollars and the number of units sold in hundreds and the profit in thousands of over the ten-year span (number of units sold, profit) for specific recorded years:
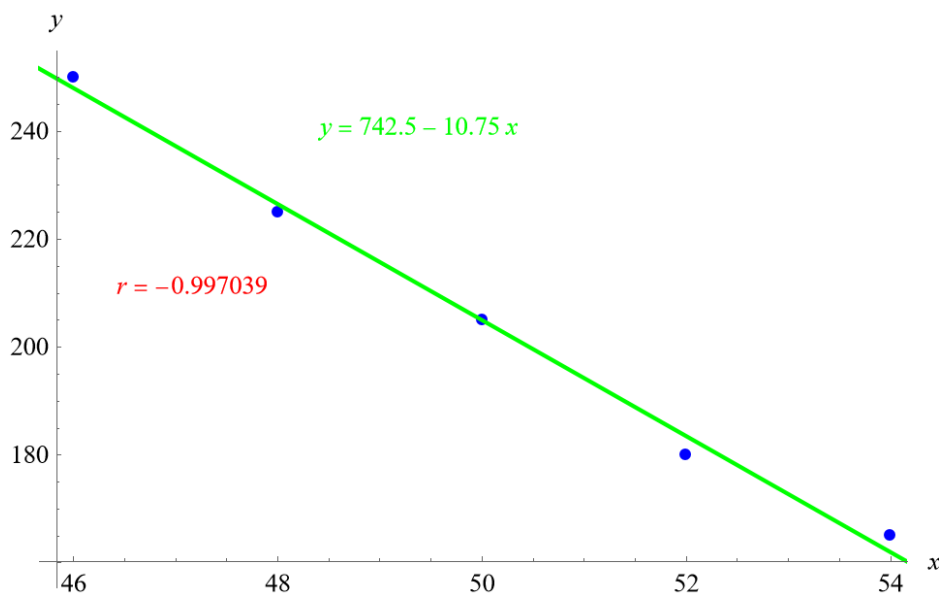
$$(46, 250), (48, 225), (50, 205), (52, 180), (54, 165).$$

Predict when the profit will dip below the $25,000 threshold.

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**Solution**

Plot the following points on a graph: $(46, 1600)$, $(48, 1550)$, $(50, 1505)$, $(52, 1540)$, and $(54, 1495)$.



Mathematica's FindFit function gives

$$y = 742.5 - 10.75x,$$

and Mathematica's Correlation function gives $r = -0.997039$. To determine when the profit will pass $25,000, set $y = 25$ and solve the equation for $x$.

$$25 = 742.5 - 10.75x$$

$$-717.5 = -10.75x$$

$$x = \frac{717.5}{10.75} \approx 66.744$$

The profit will fall below $25,000 when 6,675 units are sold.