## Exercise 40

For the following exercises, consider this scenario: The profit of a company increased steadily over a ten-year span. The following ordered pairs show 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:

$$(46, 250), (48, 305), (50, 350), (52, 390), (54, 410).$$

Predict when the profit will exceed one million dollars.

Solution

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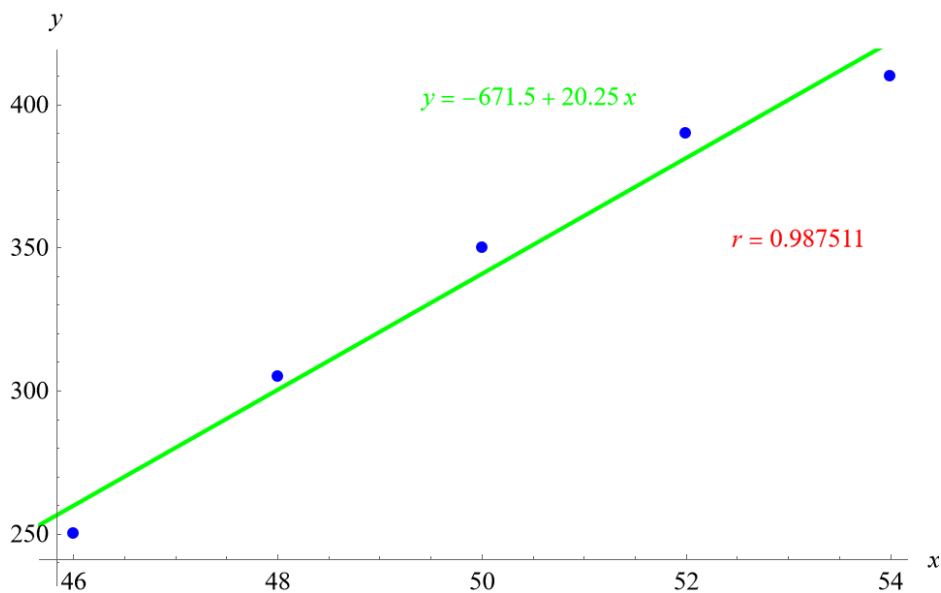
Mathematica's FindFit function gives

$$y = -671.5 + 20.25x,$$

and Mathematica's Correlation function gives $r = 0.987111$. To determine when the profit passes \$1,000,000, set $y = 1000$ and solve for x.

$$1000 = -671.5 + 20.25x$$

$$1671.5 = 20.25x$$

$$x = \frac{1671.5}{20.25} \approx 82.54$$

The profit will exceed \$1,000,000 when 8,254 units are sold.