Chapter 6 Assignment

Comparing Companies

Sid and Nancy are marketing managers for competing running shoe companies. They are comparing their annual profit equations in terms of the number of pairs of shoes manufactured and sold. Sid's equation is $P = -6n^2 + 72n - 192$. Nancy's equation is $P = -8n^2 + 40n - 32$. In both equations, P is the profit, in thousands of dollars, and n is the number of pairs of shoes manufactured and sold, in thousands.

Compare the companies in terms of maximum profit, the number of pairs of shoes manufactured to reach the maximum profit, and the break-even points.

Penny Drop

At 553 m tall, the CN Tower in Toronto is one of the world's tallest self-supporting structures. Suppose that you were standing on the observation deck at the top of the CN Tower, 447 m above the ground, and you were able to drop a penny and watch it fall to the ground. This table shows how the distance of the penny from the ground would change with time.

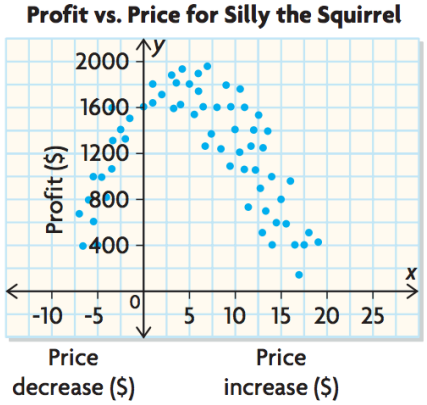
Time (s)	Distance (m)
0	447.0
2	427.4
4	368.6
6	270.6
8	133.4

a) Create a scatter plot, and draw a curve of good fit.
b) Are the data quadratic? Explain.
c) Without using quadratic regression, determine an equation for your curve of good fit.
d) Using quadratic regression, determine an equation for the curve of best fit. Compare this equation with your equation for part c). Comment on the fit.
e) How high is the penny after it has fallen for 5.5 s?

How to make quadratic regression and get equation for curve of good fit in Excel:
https://www.youtube.com/watch?v=qtiXCYumAPc

Determining Selling Price

Elaine owns a toy store. She would like to increase the profit on sales of Silly the Squirrel, which currently sells for $19.99. She has collected data, through customer surveys, about how different changes in the price would affect monthly sales. Using her graph, Elaine used two different strategies to determine a curve of good fit. She ended up with equations ① and ② at the right.



① $P = -10x^2 + 120x + 1600$
② $P = -11x^2 + 49.5x + 1598$

In both equations, x represents the increase or decrease (for negative values) in selling price, and P represents the monthly profit.

a) What selling price produces maximum profit for each equation?
b) What are the break-even prices for each equation?
c) What selling price would you recommend to Elaine? Explain why.