Example 5: Quadratic Application with Table of Values

A ball was thrown into the air and the path generated the following data:

$x = L_1$

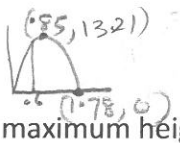
$y = L_2$

Time (sec)	0	0.25	0.5	0.75	1	1.25	1.5	1.75
Height (m)	1	9	11	13	12	11	7	0.5

Window
$x\text{-min} = 0$
$x\text{max} = 2$
$y\text{min} = -3$
$y\text{max} = 15$

a) Determine the quadratic regression equation that best matches this data.

$y = -15.67x^2 + 26.726x + 1.8125$



b) What is the maximum height the ball reaches, and when does it reach this maximum height?

Vertex (.85, 13.21) 13.21 metres

c) How high will the ball be after 0.6 sec?

2nd Trace $x = .6$ $y = 12.2$

12.21 meters

d) How long does it take until the ball hits the ground at the end of the throw?

1.78 m

e) How long does it take before the ball reaches 5 m in height for the first time?

$y_2 = 5$ 2nd TRACE Intersect $x = 0.13$

0.13 seconds it will take to reach a height of 5 metres

Example 6 Quadratic Application with Verbal Description Given

A company that sells jeans finds that when the jeans are priced at $80 per pair, they can sell 500 pairs. It is estimated that for each $2.00 decrease in price, the company can sell 50 more pairs of jeans.

a) Complete the following table of values.

b) Determine the quadratic regression equation that models the revenue as a function of the price.

$y = -25x^2 + 2500x + 0$

c) Find the price of jeans that will generate the maximum revenue.

Vertex (50, 62500) → x value

$50

d) Determine the maximum revenue.

y-value of Vertex

$62 500 is the max. revenue

$L_1 = x$ $L_2 = y$

Number of Pairs Sold	Price	Revenue $
500	80	500 × 80 = 40 000
550	80 − 2 = 78	78 × 550 = 42 900
600	78 − 2 = 76	600 × 76 = 45 600
650	76 − 2 = 74	650 × 74 = 48 100
700	74 − 2 = 72	50 400
750	72 − 2 = 70	750 × 70 = 52 500
460	80 + 4 = 84	33600