GLUE HERE

Quadratic Regression

A function that fits the pattern of a set of data that is in the shape of a parabola, or part of a parabola.

Determine whether each data set could represent a quadratic or linear function.

a.

x	0	2	4	6	8
y	-7	-1	5	11	17

+2 +2 +2 +2

+6 +6 +6 +6

$\frac{\Delta y}{\Delta x} = \frac{6}{2} = 3$

Constant Rate of Change

→ Linear Function

b.

x	-2	-1	0	1	2
y	4	1	0	1	4

+1 +1 +1 +1

Not Linear -3 -1 +1 +3

+2 +2 +2

2nd Difference is constant

→ Quadratic Function

c.

x	10	9	8	7	6
y	6	8	11	12	15

-1 -1 -1 -1

Not Linear +2 +3 +1 +3

Not Quadratic +1 -2 +2

Neither

Determine if this data represents a linear or a quadratic model. Justify your answer.

x	0	1	2	3	4
y	2	9	14	17	18

+1 +1 +1 +1

NOT Linear

+7 +5 +3 +1

Quadratic -2 -2 -2

Linear or Quadratic? Quadratic

Explain.

2nd Difference is Constant

Find the equation that represents this function and correlations of determination (R^2)

closer to 1 the Better the Quadratic Fit

$y = -x^2 + 8x + 2$ R^2 value: 1 which means

TO ENTER DATA

STAT → EDIT[1] and enter data into L_1 (x – values) and L_2 (y – values)

TO GRAPH DATA

y= → Highlight PLOT1 and press enter → ZOOM →9

TO FIND QUADRATIC REGRESSION

(Don't forget to turn on Diagnostics 2nd → 0 → DiagnosticsON, make sure calculator says "Done")

STAT → CALC → 5: Quad Reg, Arrow to StoreRegEq → VARS → Y-VARS → 1 → 1→ Calcuate

$y = ax^2 + bx + c$

$a = -1$

$b = 8$

$c = 2$

$R^2 = 1$

Example:

The following data represents the approximate heights for a ball thrown by a shot – putter as it travels a distance of x meters horizontally.

Distance (m)	Height (m)
7	8
20	15
33	24
47	26
60	24
76	21

Does the data represent a quadratic or linear function?

Write the equation that represents this function. $y = -.009x^2 + .936x + 1.44$

What is the correlation of determination? $(R^2) = .97$

Example:

The table shows the height os a model rocket after it is fired upwards from the ground.

Time (seconds)	Height (feet)
0	0
0.5	20.5
1	31.36
1.5	36.25
2	30.41
2.5	28.23

Find the best fitting quadratic model. $y = -12.87x^2 + 42.22x + 1.178$

When does the rocket hit the ground? $\approx 3\frac{1}{3}$ sec

What is the maximum height of the rocket? ≈ 36 ft

Give the reasonable Domaina and Range. $0 \le x \le 3\frac{1}{3}$ $0 \le y \le 36$