MATH 1311

Section 5.3

Modelling Data with Power Functions:

You can model power function data (or near power function data) by using the regression feature within the calculator.

As in previous examples, you can input your values using STAT → Edit and then L1 and L2. The command for power function regression is PwrReg.

Example:

A balloon is inflated at a constant rate. Its radius and volume are recorded in the following table:

Radius r	1	2	3	4	5
Volume V	4.19	33.51	113.10	268.08	523.60

Create the power function that will best represent this data.

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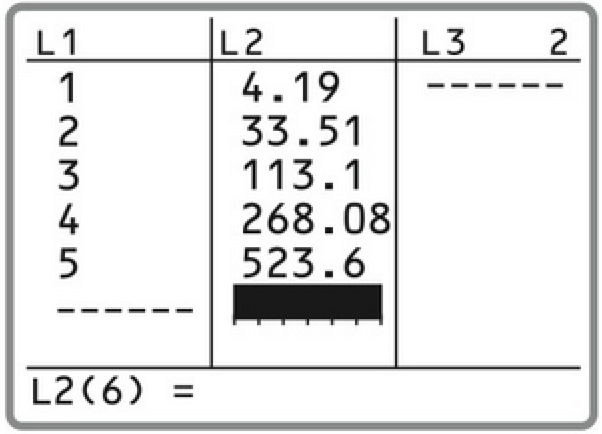
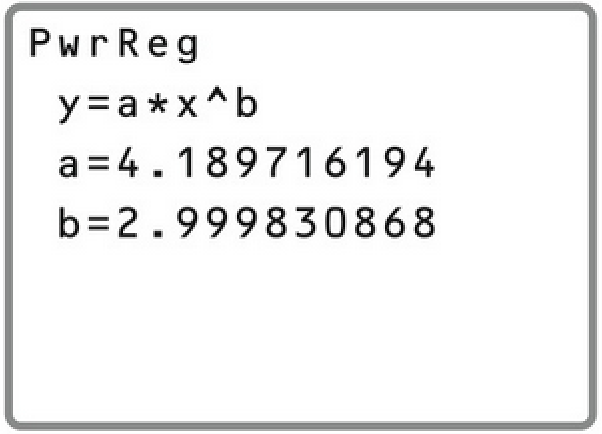
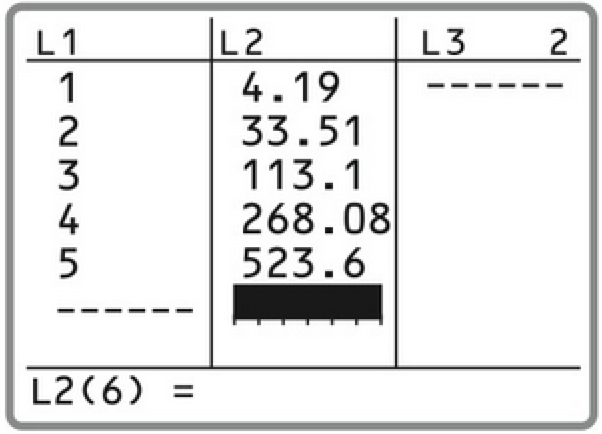
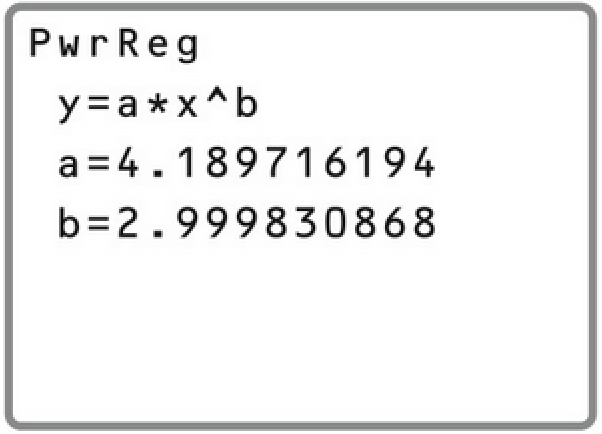
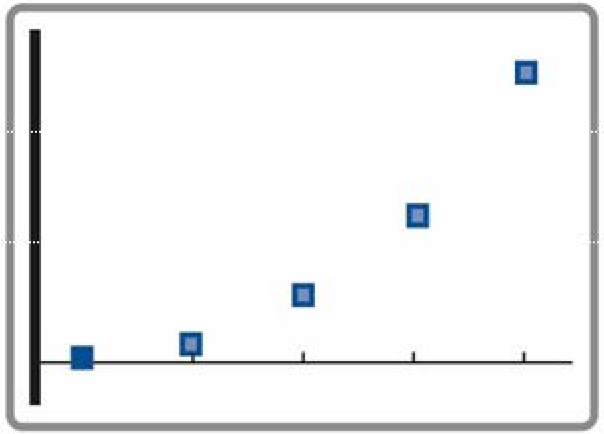


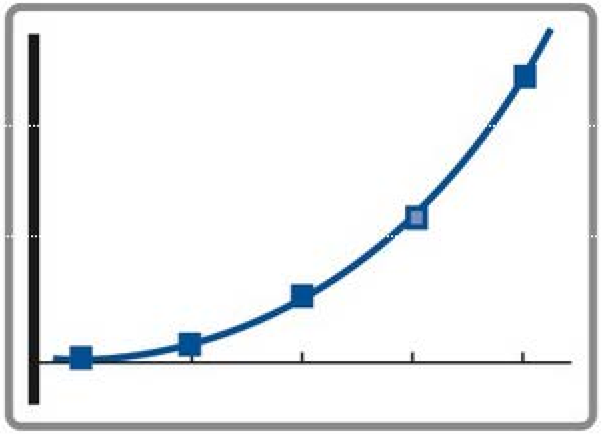


Comparison of Scatterplot and Graphs









Repeat this process for the radius and surface area of the same balloon:

Radius r	1	2	3	4	5
Surface area S	12.57	50.27	113.10	201.06	314.16

Repeat this process for the radius and surface area of the same balloon:

Radius *r*	1	2	3	4	5
Surface area *S*	12.57	50.27	113.10	201.06	314.16

Based on the tensile strength of the rubber used to manufacture this balloon, it can stretch to a surface area of 400 square inches before popping. At what radius will that occur?

Kepler’s Third Law:

Kepler discovered that there was a relationship between the average distance a planet is from the sun and the amount of time it takes to complete one orbit. The following data shows these values for our solar system:

Planet	Mercury	Venus	Earth	Mars	Jupiter	Saturn	Uranus	Neptune	Pluto
Distance *D*	36.0	67.1	92.9	141.7	483.4	886.1	1782.7	2793.1	3666.1
Period *P*	0.24	0.62	1	1.88	11.87	29.48	84.07	164.90	249

Create the power function for this data.

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Kepler's Third Law states that the average distance cubes divided by the period squared must be constant for each planet (d^3/p^2). Does your model confirm this?

The velocity of a projectile launched from the ground (during its ascent) is given by the following table:

time (seconds)	1	5	10	12	15
velocity (mph)	350	14	3.5	2.43	1.56

1. Determine the power function for the projectile’s velocity.

2. When will the projective slow to 0.01 mph (nearest 10 seconds)?