Roller Coaster Regression Project

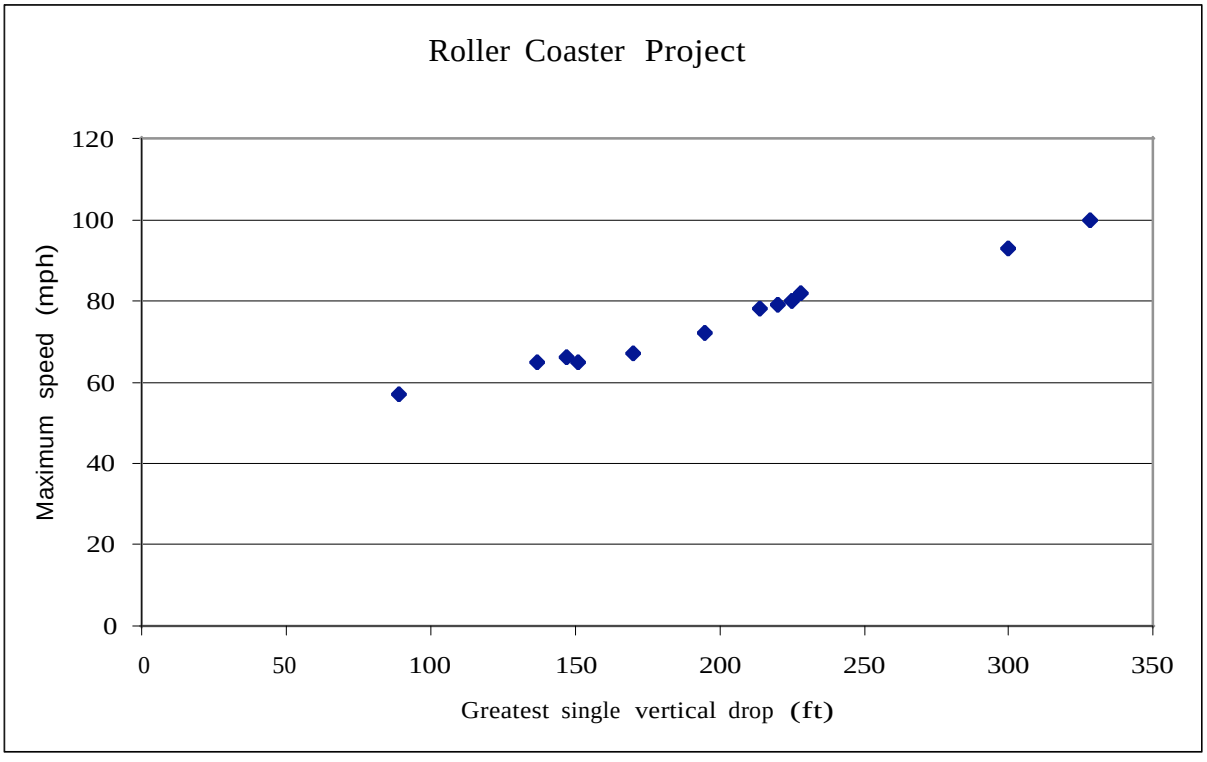
This project is worth up to 100 points and is due no later than _____.

1. Enter part of the following chart into your TI calculator statistical lists. Input just the "Greatest Single Vertical Drop [x (ft)]" column into L1 and the "Maximum Speed Attained [y (mph)]" column into L2. I did it! _____ Signature [6 points]

Label	Roller Coaster	Location	x (ft)	y (mph)
A	Scream Machine	Atlanta, GA	89	57
B	Texas Giant	Arlington, TX	137	65
C	Hercules	Allentown, PA	151	65
D	American Eagle	Gurnee, IL	147	66
E	Alpengeist	Williamsburg, VA	170	67
F	Magnum XL-200	Cedar Point, OH	195	72
G	Son of Beast	Kings Mill, OH	214	78
H	Silver Star	Rust, GERMANY	220	79
I	The Desperado	Primm, NV	225	80
J	Phantom's Revenge	Kennywood, PA	228	82
K	Millennium Force	Cedar Point, OH	300	93
L	Superman The Escape	Valencia, CA	328	100

2. Use the calculator to construct a scatter plot of the data. In your scatter plot, place the greatest single vertical drop on the horizontal axis and the maximum speed attained on the vertical axis. I did it! _____ Signature [6 points]

On the scatter plot below, label (by hand) the points for the Scream Machine (A), Silver Star (H), and Millenium Force (K). [6 points]



3. Have the software (or calculator) compute the necessary coefficients for the quadratic curve that best fits the scatter plot. Sketch the curve of best fit on the scatter plot, and record the equation and the R^2 value below. Compute the correlation coefficient (R value). Round all coefficients to 8 decimal places. [16 points]

Quadratic equation: _____

R^2 value: _____

R value: _____

4. The Raging Bull roller coaster in Gurnee, Illinois has a 208-foot vertical drop. Use your quadratic regression equation to predict its maximum speed to the nearest tenth of a mile per hour. (The actual speed is 73 mph.) *Show your work with the formula*. [5 points]

5. For the Magnum XL-200 roller coaster with a 195-foot vertical drop, use your quadratic regression equation to predict its maximum speed to the nearest tenth of a mile per hour. (The actual speed is 72 mph.) *Show your work with the formula*. [5 points]

6. For the Hercules roller coaster with a 151-foot vertical drop, use your quadratic regression equation to predict its maximum speed to the nearest tenth of a mile per hour. (The actual speed is 65 mph.) *Show your work with the formula*. [5 points]

7. (a) How close are the predictions from #4–6 and the actual maximum speeds for these roller coasters?

Raging Bull _____

Magnum XL-200 _____

Hercules _____

(b) Based on the value of r, how would you describe the strength and type of relationship between x and y?

___ strong positive or negative correlation

___ no significant correlation [8 points]

8. You are designing a track, and you have decided that you would like the roller coaster to reach a maximum speed of 90 mph! Use your quadratic regression equation to predict the greatest single vertical drop to the nearest foot. *Show your work.* [6 points]

9. Find the greatest single vertical drop (to the nearest foot) _____ and the maximum speed (to the nearest mile per hour) _____ for Top Thrill Dragster in Cedar Point, Ohio. **Provide a printout that supports your findings.** [6 points]

Find the greatest single vertical drop (to the nearest foot) _____ and the maximum speed (to the nearest mile per hour) _____ for Kingda Ka in Jackson, New Jersey. **Provide a printout that supports your findings.** [6 points]

10. Pick a roller coaster NOT in the original chart and find out 5 specific facts in the following categories: date of construction, cost involved, height, vertical drop, maximum speed, angle of descent, track length, park name and location, etc. **Provide a printout that supports your findings.** [7 points]

11. Our chart (#1) includes wooden roller coasters and steel coasters. Find the fastest of the wooden coasters _____ , and find out these specific facts:

Duration of ride: _____ min _____ sec
Structure made of _____ million board feet of _____ (lumber type)
Length of track: _____ feet
G-Force: _____ Maximum Vertical angle: _____
Capacity: _____ riders per hour

Provide a printout that supports your findings. [18 points]

Recommended Sites:
www.rcdb.com, www.funderstanding.com/k12/coaster,
www.howstuffworks.com/roller-coaster.htm

Do your best! Live and learn!