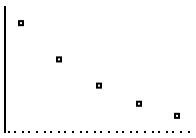
Name: _____ Non-linear Regression
AP Statistics

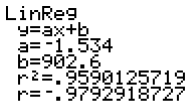
For the following problems, sketch a scatterplot & residual plot. If necessary, transform the data and re-plot. Find an appropriate regression equation that can be use to make predictions.

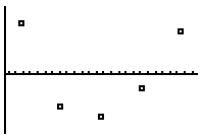
1) We attempt to find how the volume of a gas depends on the temperature and pressure of the gas. If temperature is held constant at 300 K, the following results are obtained. Predict the volume if the pressure is 325.

Pressure	200	250	300	350	400
Volume	625	500	417	357	313

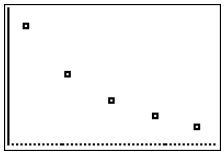
x & y

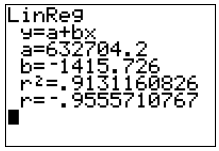


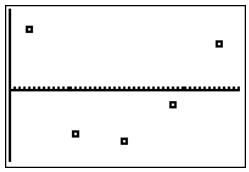




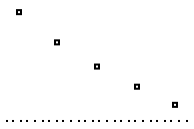
x & y^2

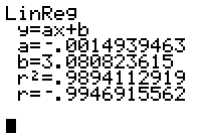


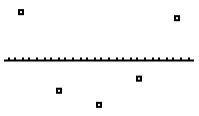




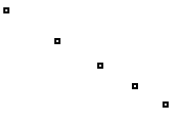
x & log y

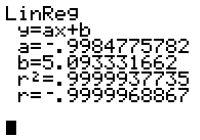


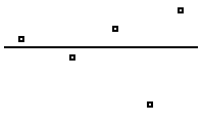




log x & log y



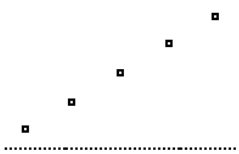


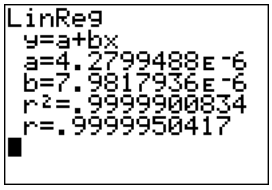


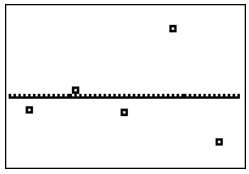
$\log \hat{y} = -.998 \log x + 5.093$

384.83

x & 1/y







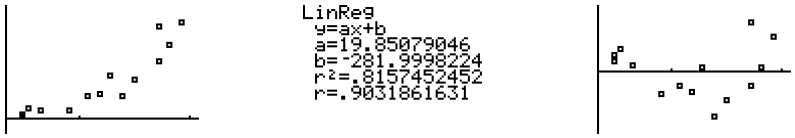
$1/\hat{y} = .00000427 + .00000798\ x$

384 .94

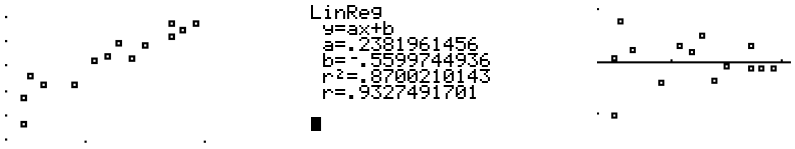
2) The problem of soil erosion is faced by farmers all over the world. The following data was from a study in western India. Predict the amount of erosion is the wind velocity is 24 km/hr.

Velocity (km/hr)	13.5	13.5	14	15	17.5	19	20	21	22	23	25	25	26	27
Erosion (kg/day)	5	15	35	25	25	70	80	140	75	125	190	300	240	315

x & y



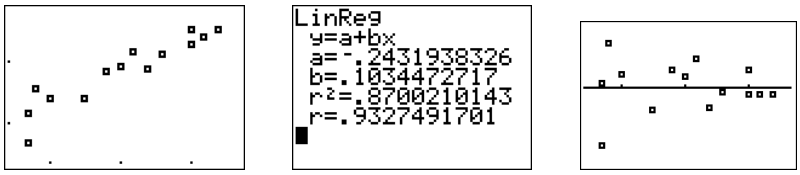
x & ln y



$\ln \hat{y} = .238x - .560$

173.60 kg/day

x & log y



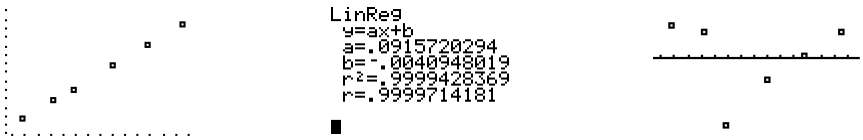
$\log \hat{y} = .103x - .243$

169.43 kg/day

3) Cyrus Tist was trying to determine how the pressure exerted on the floor by the heel of a shoe depends on the width of the heel and the weight of the person wearing the shoe. He started by measuring the pressure (in psi) exerted by several people wearing a shoe with a heel width of 3.5 inches. The data are summarized below. Predict the pressure exerted on the heel with a width of 3.5 inches if the person weighs 175 pounds.

Wt (lb)	62	85	100	128	154	180
Pressure	5.7	7.8	9.1	11.7	14.1	16.5

x & y



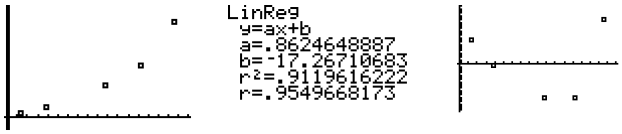
$\hat{y} = .092x - .004$

16.02 psi

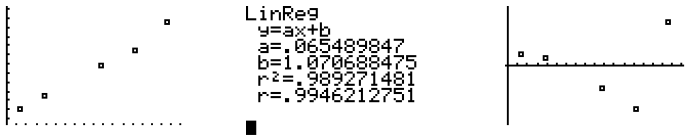
4) The following data are the shoulder-hip length and the vertical thickness of the bodies of some quadrupeds at the zoo in Zurich, Switzerland. Predict the vertical thickness of a giraffe if the shoulder-hip length is 145 cm.

Animal	length (cm)	Height (cm)
Ermine	12	4
Dachshund	35	12
Indian Tiger	90	45
Llama	122	73
Indian elephant	153	135

x & y



x & $\sqrt{y}$



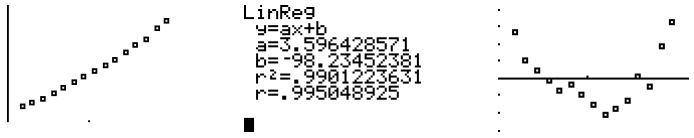
$\sqrt{\hat{y}} = .065x + 1.07$

111.66 cm

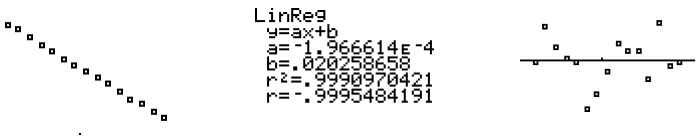
5) Consider the data on x = height (in.) and y = average weight (lb.) for American females aged 30-39. Predict the weight of a female that is 64.5 inches tall.

X	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
Y	113	115	118	121	124	128	131	134	137	141	145	150	153	159	164

x & y



x & $\frac{1}{y}$



$\frac{1}{\hat{y}} = -.000197x + .0203$

132.03 pounds