

11.5: Biometrics Lab #5

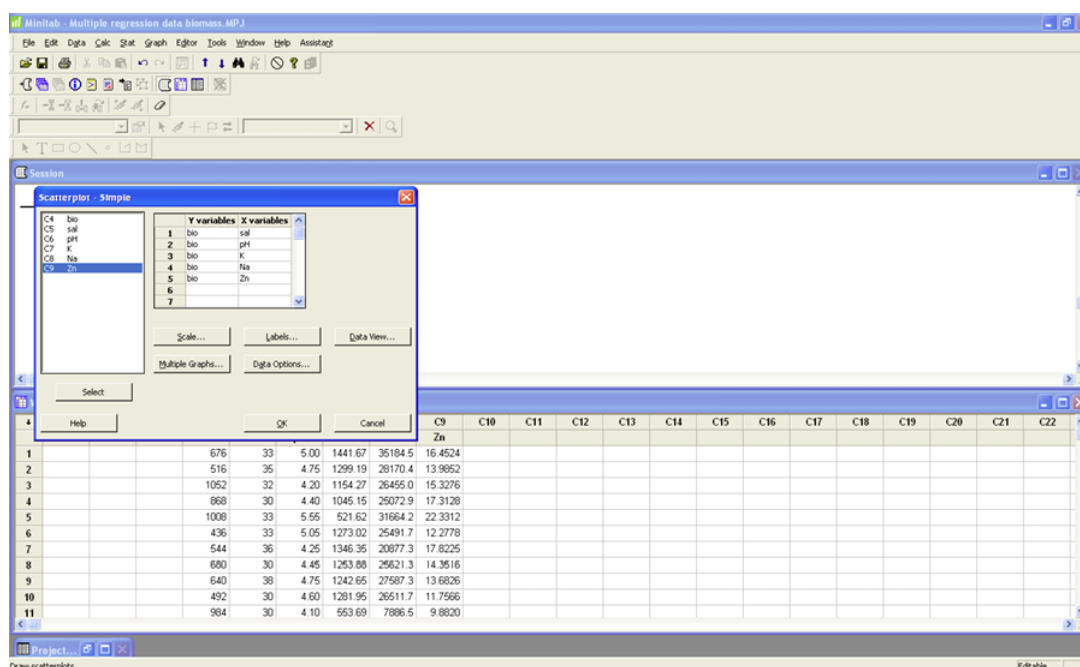
Name: _____

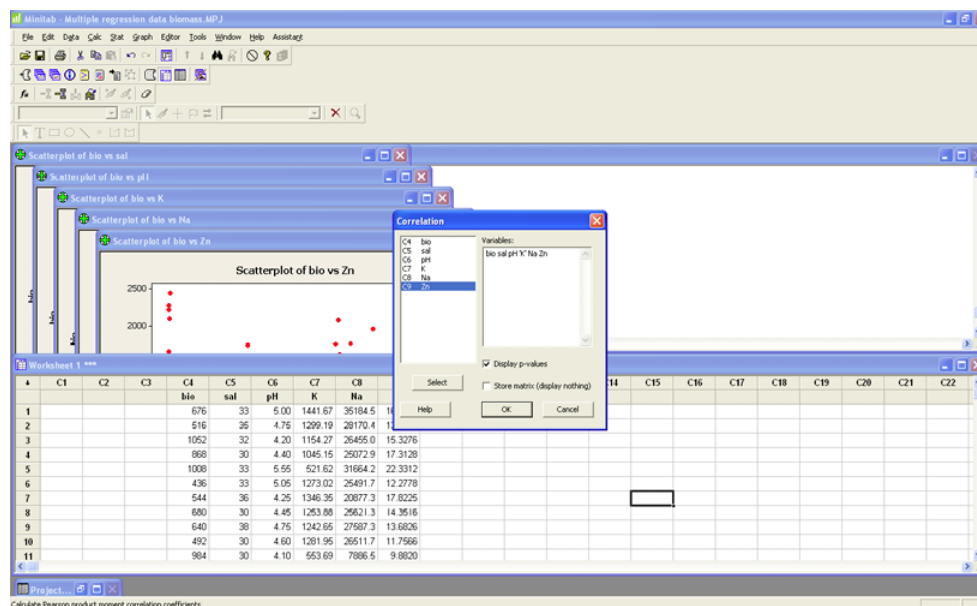
You are working on an alternative energy source and biomass is a key component. You want to predict above-ground biomass for this region, and you believe that biomass is related to substrate (subsoil) variables of salinity, water acidity, potassium, sodium, and zinc. Your crew collects information on biomass and these five variables for 45 plots.

Experiment 1

Before you create this regression model, you must examine the relationships between each of the five predictor variables and biomass (the response variable). Create five scatterplots using biomass as the response variable (y) and each of the predictor variables (x). Compute the linear correlation coefficient for each pair. Describe the relationships.

GRAPH>Scatterplot>Simple>OK. The response variable (y-variable) is Bio and the five predictor variables are the x-variables. Look at the scatterplots and describe each relationship below. Next compute the correlation coefficient for each pair and write the r-value below. **STAT>Basic Statistics>Correlation.** You can easily do all correlations at once by creating a correlation matrix. Put all predictor variables in the **Variables** box together.





Correlation (r) Description

Bio v. sal _____

Bio v. pH _____

Bio v. K _____

Bio v. Na _____

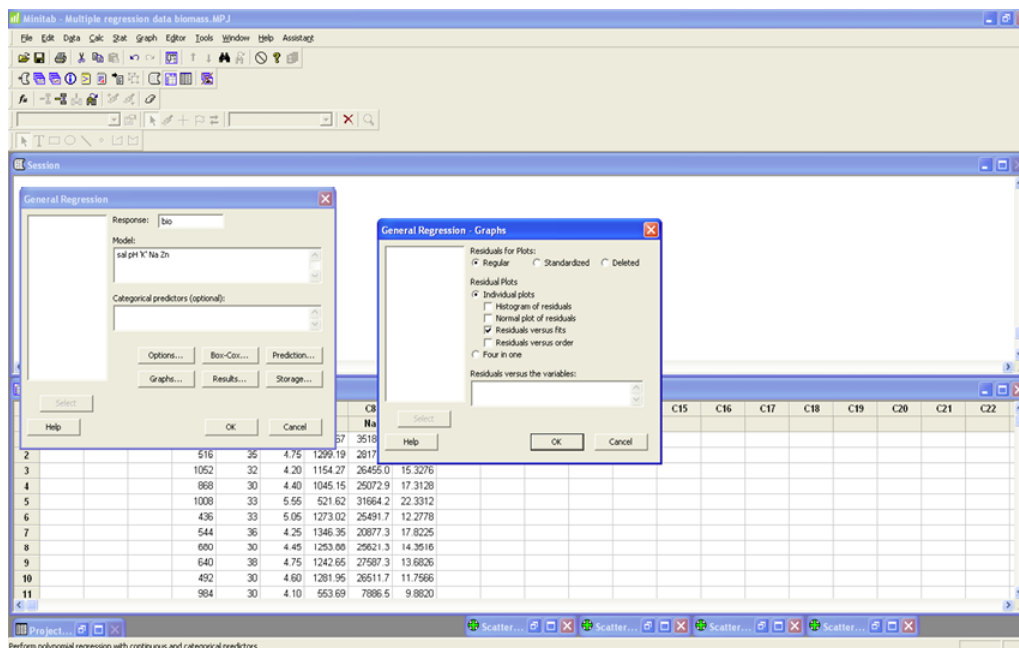
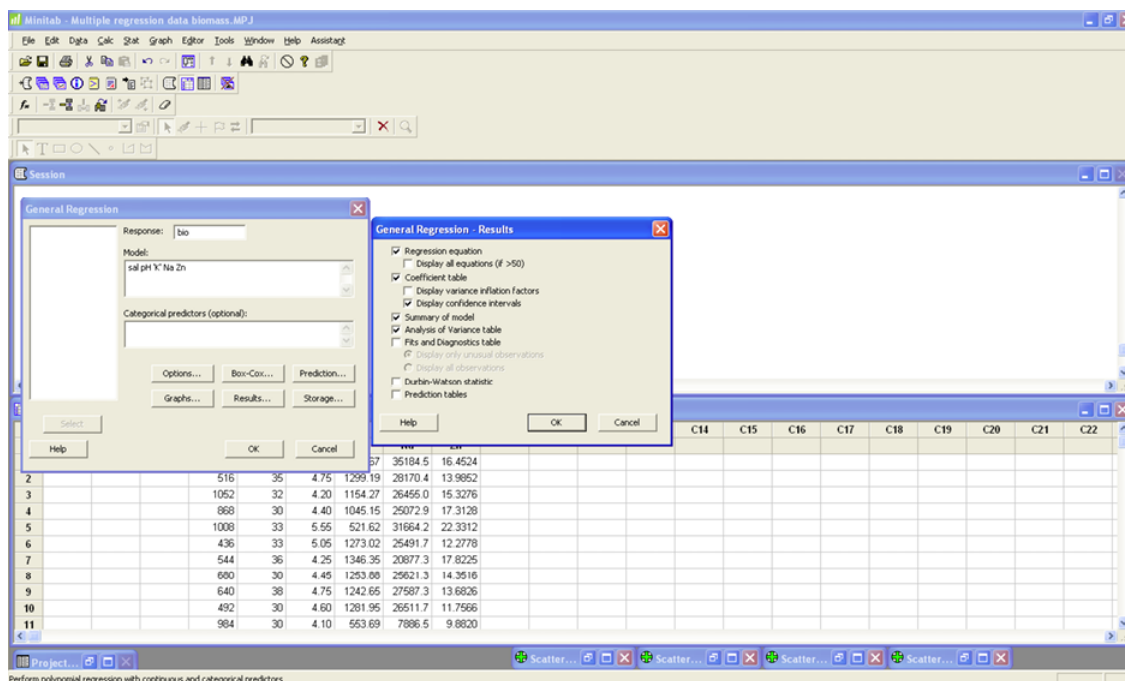
Bio v. Zn _____

Circle the above pair that has the strongest linear relationship.

Experiment 2

You are now going to create four regression models using the predictor variables. You will compare the adjusted R², regression standard error, p-values for each coefficient, and the residuals for each model. Using this information, you will select the best model and state your reasons for this choice.

Begin with the full model using all five predictor variables. **STAT>Regression>General Regression**. Put Bio in the **Response** box and all five predictor variables in the **Model** box (see image). Click **Results** and make sure that the Regression equation, coefficient table, Display confidence intervals, Summary of Model, and Analysis of Variance Table are checked (see image). Click OK. Click **Graphs** and make sure that under **Residual Plots** that Individual plots and Residual versus Fits are selected (see image). Click OK.



MODEL 1

Write the regression model _____

Write the adj. R² _____

Write the regression standard error _____

Examine the residual plot. Are there any problems? _____

Write the variables which are NOT significant _____

MODEL 2

Now remove the LEAST significant variable (highest p-value) and repeat the steps using only the remaining variables.

Write the regression model _____

Write the adj. R^2 _____

Write the regression standard error _____

Examine the residual plot. Are there any problems? _____

Write the variables which are NOT significant _____

MODEL 3

Now remove the LEAST significant variable (highest p-value) and repeat the steps using only the remaining variables.

Write the regression model _____

Write the adj. R^2 _____

Write the regression standard error _____

Examine the residual plot. Are there any problems? _____

Write the variables which are NOT significant _____

MODEL 4

Now remove the LEAST significant variable (highest p-value) and repeat the steps using only the remaining variables.

Write the regression model _____

Write the adj. R^2 _____

Write the regression standard error _____

Examine the residual plot. Are there any problems? _____

Write the variables which are NOT significant _____

Experiment 3

Select the best model and state your reasons for selecting this model.

biomass	sal	pH	K	Na	Zn
676	33	5	1441.67	35184.5	16.4524
516	35	4.75	1299.19	28170.4	13.9852
1052	32	4.2	1154.27	26455	15.3276
868	30	4.4	1045.15	25072.9	17.3128
1008	33	5.55	521.62	31664.2	22.3312
436	33	5.05	1273.02	25491.7	12.2778
544	36	4.25	1346.35	20877.3	17.8225
680	30	4.45	1253.88	25621.3	14.3516
640	38	4.75	1242.65	27587.3	13.6826
492	30	4.6	1281.95	26511.7	11.7566
984	30	4.1	553.69	7886.5	9.882
1400	37	3.45	494.74	14596	16.6752
1276	33	3.45	525.97	9826.8	12.373
1736	36	4.1	571.14	11978.4	9.4058
1004	30	3.5	408.64	10368.6	14.9302
396	30	3.25	646.65	17307.4	31.2865
352	27	3.35	514.03	12822	30.1652
328	29	3.2	350.73	8582.6	28.5901
392	34	3.35	496.29	12369.5	19.8795
236	36	3.3	580.92	14731.9	18.5056
392	30	3.25	535.82	15060.6	22.1344
268	28	3.25	490.34	11056.3	28.6101
252	31	3.2	552.39	8118.9	23.1908
236	31	3.2	661.32	13009.5	24.6917
340	35	3.35	672.15	15003.7	22.6758
2436	29	7.1	528.65	10225	0.3729
2216	35	7.35	563.13	8024.2	0.2703
2096	35	7.45	497.96	10393	0.3205
1660	30	7.45	458.38	8711.6	0.2648
2272	30	7.4	498.25	10239.6	0.2105
824	26	4.85	936.26	20436	18.9875
1196	29	4.6	894.79	12519.9	20.9687
1960	25	5.2	941.36	18979	23.9841
2080	26	4.75	1038.79	22986.1	19.9727
1764	26	5.2	898.05	11704.5	21.3864
412	25	4.55	989.87	17721	23.7063
416	26	3.95	951.28	16485.2	30.5589
504	26	3.7	939.83	17101.3	26.8415
492	27	3.75	925.42	17849	27.7292
636	27	4.15	954.11	16949.6	21.5699
1756	24	5.6	720.72	11344.6	19.6531
1232	27	5.35	782.09	14752.4	20.3295
1400	26	5.5	773.3	13649.8	19.588
1620	28	5.5	829.26	14533	20.1328
1560	28	5.4	856.96	16892.2	19.242

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