1. **50 pts** Data on the average low and average high temperature (degrees Fahrenheit) for 20 cities in the U.S. is collected. The latitude (degrees north of the equator) for each city is also noted. Below are the data. Refer to the JMP output entitled Predicting Average High Temperature.

<table>
<thead>
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<th>Latitude</th>
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<th>Low</th>
<th>Latitude</th>
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<th>Low</th>
<th>Latitude</th>
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</tbody>
</table>

(a) **3** What is the prediction equation and the value of $R^2$ for the simple linear regression of average High temperature on average Low temperature?

(b) **3** What is the value of the adjusted $R^2$ for the simple linear regression of average High temperature on average Low temperature?

(c) **4** Is the model that uses average Low temperature to predict average High temperature statistically significant? Support your answer.

(d) **3** What is the prediction equation and the value of $R^2$ for the multiple regression of average High temperature on average Low temperature and Latitude?

(e) **4** Does Latitude add significantly to the explanatory ability of the model with just average Low temperature? Support your answer.

(f) **4** Is there a statistically significant interaction between average Low temperature and Latitude? Support your answer.

(g) **4** If there was a significant interaction between average Low temperature and Latitude (not necessarily the case) what would that say about the relationship between average High temperature and average Low temperature?

(h) **3** How would you check to see if average Low temperature and Latitude are multicollinear?

(i) **3** Give the prediction equation and value of $R^2$ for the simple linear regression of average High temperature on Latitude.

(j) **4** Give an interpretation of the estimated slope coefficient for Latitude.

(k) **4** Why is it not a good idea to use the prediction equation relating Latitude to average High temperature to predict the average High temperature in Caracas, Venezuela (10.5 degrees north latitude)?

(l) **4** Would you suggest adding a Latitude$^2$ term to the model with just Latitude in it? Support your decision based on the information provided in the JMP output.

(m) **4** Describe the distribution of residuals. What does this indicate about the condition of normality?

(n) **3** Which model would you use to predict average High temperature?

- average Low temperature alone
- Latitude alone
- average Low temperature and Latitude
- average Low temperature, Latitude and Low*Latitude

Explain your choice briefly.