**HOT SPOTS: Latitude and Temperature**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

A meteorologist is exploring the relationship between latitude and temperature. He brought the following data to your science class. Several students began to discuss their interpretations. **ALL WRITTEN ANSWERS MUST BE IN COMPLETE SENTENCES.**

Latitude vs. Mean high April Temperature in the Northern Hemisphere

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| --- | --- | --- |
| City | Latitude(° N) | April Mean High Temperature (° F) |
| **Kampala, Uganda** | 0 | 91 |
| **Accra, Ghana** | 6 | 88 |
| **Manila, Philippines** | 14 | 92 |
| **Morelia, Mexico** | 19 | 86 |
| **Hanoi, Vietnam** | 21 | 81 |
| **Calcutta, India** | 23 | 97 |
| **Cairo, Egypt** | 30 | 83 |
| **Tokyo, Japan** | 35 | 63 |
| **Mosul, Iraq** | 36 | 77 |
| **Rome, Italy** | 42 | 68 |
| **Belgrade, Serbia** | 45 | 45 |
| **Kiev, Ukraine** | 50 | 57 |
| **Copenhagen, Denmark** | 56 | 47 |
| **Moscow, Russia** | 56 | 47 |

1. What predictions or observations can you make about temperature and latitude from looking at this table?
2. What are the two variables in this table?

|  |  |
| --- | --- |
| Independent Variable $(x)$ | Dependent Variable $(y)$ |

1. State three possible **lurking variables** that might also impact a city’s temperature other than latitude.
2. Make a scatter plot of the data. Be sure to include a title, labeled axes and consistently marked intervals.

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\*\*\*\*\*BEFORE YOU MOVE ON, HAVE YOUR GRAPH INITIALED BY YOUR TEACHER: \_\_\_\_\_

1. Describe the association.
2. **Draw the line of best fit above using either lattice points or actual points.**
3. Find the city with the largest residual, state the city and estimate the residual graphically. What is the meaning of the residual int his context?
4. Draw the upper and lower bound lines on the graph about using dashed line.
	1. For all cities with a latitude of 45⁰, what would be considered a reasonable range of April high temperatures?
5. Identify two points on your line (either an actual city or a lattice point you identified on your line).

 **Point#1 Latitude: \_\_\_\_\_\_\_\_ Temperature: \_\_\_\_\_\_\_\_**

 **Point#2 Latitude: \_\_\_\_\_\_\_\_ Temperature: \_\_\_\_\_\_\_\_**

1. Write an equation using the two points you selected. **SHOW WORK BELOW**

 **What is the equation? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. Find the equations of your upper and lower bound lines.
2. What are the coordinates for the y-intercept for your line of best fit? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What does this point represent in context of this problem?

Explain whether or not this is reasonable?

1. What is the slope of your line of best fit? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What does the slope represent in context of this problem (be specific)?

1. Why might the line of best fit equation be useful? What can it be used for?
2. Sketch an approximate residual plot on a piece of graph paper. How appropriate is a linear model for this situation? Explain using your residual plot.
3. Use your calculator to find the LSRL. Record the equation of your line, the $r$ value, and the $r^{2}$
4. How well did you do writing your line of best fit compared to the LSRL?
5. Write a sentence interpreting the correlation coefficient *r*.
6. Write a sentence interpreting the $r^{2}$

The table below shows NEW cities. Use your **LSRL** **to calculate** the predicated values for the cities.

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| --- | --- | --- | --- | --- |
| City | North Latitude(°N) | April Mean High Temperature (°F) | Temperature **as predicted by your LSRL** (°F) | Residual:Difference between actual and predicted temperature |
| **Quito, Ecuador**  | 0 | 67 |   |  |
| **Lagos, Nigeria** | 6 | 89 |   |  |
| **Serrekunda, The Gambia** | 13 | 105 |   |  |
| **San Juan, Puerto Rico** | 18 | 84 |   |  |
| **Calcutta, India** | 23 | 97 |   |  |
| **Dubai, UAE** | 25 | 91 |   |  |
| **Cairo, Egypt** | 30 | 83 |   |  |
| **Tokyo, Japan** | 35 | 63 |   |  |
| **Rome, Italy** | 42 | 68 |   |  |
| **Belgrade, Serbia**  | 45 | 45 |   |  |
| **London, England** | 52 | 56 |   |  |
| **Moscow, Russia** | 56 | 47 |   |  |
| **Reykjavik, Iceland** | 64 | 43 |   |  |
| **Barrow, Alaska** | 71 | 9 |   |  |