AP Stats Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Review: Regression

|  |  |  |
| --- | --- | --- |
| Pizza | Fat (g) | Calories |
| Pizza Hut's Hand Tossed | 9 | 305 |
| Domino's Deep Dish | 16 | 382 |
| Pizza Hut's Pan | 14 | 338 |
| Domino's Hand Tossed | 9 | 327 |
| Little Caesar's Pan!Pan! | 10 | 309 |
| Little Caesar's Pizza! Pizza! | 11 | 313 |
| Pizza Hut's Stuffed Crust | 13 | 349 |

1. Some pizza facts.
2. Identify the explanatory and response variables.
3. Construct a scatterplot. Describe the relationship.
4. Compute the correlation coefficient.
5. Based on the value of the correlation, is it reasonable to conclude that more fat in the pizza causes the pizza to have more calories? Explain.
6. Find the equation of the least-squares line.
7. When the fat content changes by 1 gram, by how much does the calorie content tend to change.
8. Explain the y-intercept of the least-squares line.
9. What would you predict the number of calories are in a pizza with a fat content of 11 grams?
10. Can I use this to predict the number of calories in a pizza that has a fat content of 20 grams?
11. What calorie amount would you predict for a pizza with a fat content of 11 grams? What is the residual corresponding to the observation (11, 313)?
12. Calculate the SSE. What does this represent?
13. Calculate the SST. What does this represent?
14. **Calculate** and interpret the value of r2.
15. Find and interpret the value of se.
16. The table below describes the relationship between latitude and average July temperature in the twelve largest U.S. cities.



1. Draw the residual plot.
2. Is a linear plot appropriate? Explain.
3. Phoenix has a very large positive residual. How would the

 slope of the regression line change if it were removed

from the data set?

1. Alana’s favorite exercise machine is a stair climber. On the “random” setting, it changes speeds at regular intervals, so the total number of simulated “floors” she climbs varies from session to session. She also exercises for different lengths of time each session. She decides to explore the relationship between the number of minutes she works out on the stair climber and the number of floors it tells her that she’s climbed. She records minutes of climbing time and number of floors climbed for six exercise sessions. The computer output from a linear regression analysis of the data is shown below.



1. What is the equation of the LSRL?
2. Find and interpret the correlation coefficient.
3. Find and interpret the coefficient of determination.
4. Find and interpret the standard deviation of the error.

5. Do aircraft with a higher typical speed also have a greater average flight length? Find the equation that best describes this relationship and use it to predict the Flight length for a speed of 445 mph.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Speed (mph) | Flight Length (mi) |  | Speed (mph) | Flight Length (mi) |
| 518 | 2882 |  | 441 | 782 |
| 539 | 5063 |  | 440 | 742 |
| 529 | 3321 |  | 458 | 1101 |
| 498 | 1363 |  | 414 | 702 |
| 513 | 2451 |  | 432 | 798 |
| 498 | 1493 |  | 416 | 602 |
| 504 | 1963 |  | 374 | 345 |
| 516 | 2379 |  | 388 | 442 |
| 467 | 1126 |  | 412 | 570 |
| 524 | 3253 |  | 387 | 487 |
| 523 | 2995 |  | 389 | 468 |
| 495 | 2331 |  | 384 | 500 |
| 464 | 1167 |  | 380 | 413 |
| 486 | 2135 |  |  |  |

1. The number of hours a student studied for the exam (x) was correlated with the students’ score on the exam(y) to obtain the least squares regression line: .
2. Find and interpret the slope.
3. Find and interpret the y-intercept.
4. Find the residual amount for a student who studied 3 hours and made an 83 on the exam.
5. Find the correlation coefficient and the least squares regression line for each set of data shown below. Then find the residual plot. Discuss what you found.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| x | 10 | 8 | 13 | 9 | 11 | 14 | 6 | 4 | 12 | 7 | 5 |
| y | 8.04 | 6.95 | 7.58 | 8.81 | 8.83 | 9.96 | 7.24 | 4.26 | 10.84 | 4.82 | 5.68 |

 a.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| x | 10 | 8 | 13 | 9 | 11 | 14 | 6 | 4 | 12 | 7 | 5 |
| y | 9.14 | 8.14 | 8.74 | 8.77 | 9.26 | 8.1 | 6.13 | 3.1 | 9.13 | 7.26 | 4.74 |

 b.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| x | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 19 |
| y | 6.58 | 5.76 | 7.71 | 8.84 | 7.04 | 5.25 | 5.56 | 7.91 | 6.89 | 8.47 | 12.5 |

 c.