For each of the following questions provide:

* + Correlation analysis
  + Scatter plot matrix
  + Regression analysis

Explain your decision making and interpret your results

1. All green wants to open a franchise in a new neighborhood and wants to estimate its potential sales. The store will have 3000 square feet; will serve 10,000 households; will invest $8,000 in advertising; will have 4 competitors in the area; and will carry $45,500 in inventories

Here is the table:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Annual sales [$000] | Area  [1000 sft] | Inventory [$000] | Advertising [$000] | Households[000] | Competitors |
| 231 | 3 | 29.4 | 8.2 | 8.2 | 11 |
| 156 | 2.2 | 23.2 | 6.9 | 4.1 | 12 |
| 10 | 0.5 | 14.9 | 3 | 4.3 | 15 |
| 519 | 5.5 | 60.0 | 12 | 16.1 | 1 |
| 437 | 4.4 | 56.7 | 10.6 | 14.1 | 5 |
| 487 | 4.8 | 57.1 | 11.8 | 12.7 | 4 |
| 299 | 3.1 | 51.2 | 8.1 | 10.1 | 10 |
| 195 | 2.5 | 34.7 | 7.7 | 8.4 | 12 |
| 20 | 1.2 | 21.2 | 3.3 | 2.1 | 15 |
| 68 | 0.6 | 10.2 | 4.9 | 4.7 | 8 |
| 570 | 5.4 | 78.8 | 17.4 | 12.3 | 1 |
| 428 | 4.2 | 57.7 | 10.5 | 14 | 7 |
| 464 | 4.7 | 53.5 | 11.3 | 15 | 3 |
| 15 | 0.6 | 16.3 | 2.5 | 2.5 | 14 |
| 65 | 1.2 | 16.8 | 4.7 | 3.3 | 11 |
| 98 | 1.6 | 15.1 | 4.6 | 2.7 | 10 |
| 398 | 4.3 | 34.2 | 5.5 | 16 | 4 |
| 161 | 2.6 | 19.6 | 7.2 | 6.3 | 13 |
| 397 | 3.8 | 45.3 | 10.4 | 13.9 | 7 |
| 497 | 5.3 | 51.8 | 11.5 | 16.3 | 1 |
| 528 | 5.6 | 61.5 | 12.3 | 16 | 0 |
| 99 | 0.8 | 27.8 | 2.8 | 6.5 | 14 |
| 0.5 | 1.1 | 14.2 | 3.1 | 1.6 | 12 |
| 347 | 3.6 | 46.1 | 9.6 | 11.3 | 6 |
| 341 | 3.5 | 38.2 | 9.8 | 11.5 | 5 |
| 507 | 5.1 | 59.0 | 12 | 15.7 | 0 |
| 400 | 8.6 | 51.7 | 7 | 12 | 8 |

1. The manufacturing company (data set 1) is planning to buy a system that will control the temperature of the mix.

The system will keep mix temperature between 70 and 72 degrees

The system will cost $300 per week.

Would you recommend the purchase and installation of the system? Support your analysis with a quantitative analysis.

Here is the table:

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Week** | **Units Produced** | **Mix Temperature** | **Defective Rate** | **Sick days** | **Cost/Unit** |  | **Week** | **Units Produced** | **Mix Temperature** | **Defective Rate** | **Sick days** | **Cost/Unit** |
| **1** | 414 | 84 | 0.072 | 5 | 44.07 |  | **16** | 432 | 72 | 0.056 | 4 | 43.34 |
| **2** | 416 | 77 | 0.069 | 5 | 43.71 |  | **17** | 414 | 84 | 0.052 | 6 | 44.06 |
| **3** | 428 | 88 | 0.064 | 4 | 44.12 |  | **18** | 427 | 74 | 0.067 | 4 | 43.47 |
| **4** | 416 | 77 | 0.069 | 5 | 43.71 |  | **19** | 408 | 90 | 0.065 | 6 | 44.42 |
| **5** | 405 | 80 | 0.070 | 6 | 43.96 |  | **20** | 435 | 81 | 0.051 | 4 | 43.73 |
| **6** | 427 | 74 | 0.047 | 5 | 43.47 |  | **21** | 403 | 90 | 0.055 | 7 | 44.47 |
| **7** | 406 | 78 | 0.069 | 6 | 43.85 |  | **22** | 413 | 70 | 0.055 | 6 | 43.40 |
| **8** | 415 | 82 | 0.071 | 5 | 43.96 |  | **23** | 414 | 83 | 0.052 | 6 | 44.02 |
| **9** | 431 | 76 | 0.058 | 4 | 43.53 |  | **24** | 404 | 86 | 0.073 | 6 | 44.27 |
| **10** | 431 | 75 | 0.058 | 4 | 43.49 |  | **25** | 432 | 74 | 0.057 | 4 | 43.43 |
| **11** | 423 | 70 | 0.055 | 5 | 43.32 |  | **26** | 414 | 85 | 0.053 | 6 | 44.11 |
| **12** | 412 | 71 | 0.056 | 6 | 43.45 |  | **27** | 404 | 85 | 0.073 | 6 | 44.22 |
| **13** | 432 | 73 | 0.057 | 4 | 43.39 |  | **28** | 431 | 78 | 0.059 | 4 | 43.63 |
| **14** | 424 | 83 | 0.052 | 5 | 43.92 |  | **29** | 411 | 78 | 0.059 | 6 | 43.80 |
| **15** | 416 | 75 | 0.048 | 6 | 43.61 |  | **30** | 425 | 81 | 0.051 | 5 | 43.82 |

1. A doctor’s office wants to predict Body fat based on **tight** fat content, **mid-arm** circumference, and **triceps** fat electric conductivity. The cost of testing tight fat content is $300, the cost of measuring mid-arm circumference is $20, and the cost of measuring triceps fat electric conductivity is $150 dollars. **Find a good and economic model** for the doctor’s office. (**Hint:** run different models).

Predict the body fat of a patient with 26.2 triceps fat electric conductivity, 35.0 mid-arm circumference, and 55 tight fat content. Use the prediction to discuss the pros and cons of your model.

|  |  |  |  |
| --- | --- | --- | --- |
| Fat | Triceps | Midarm | Thigh |
| 11.9 | 19.5 | 29.1 | 43.1 |
| 22.8 | 24.7 | 28.2 | 49.8 |
| 18.7 | 30.7 | 37 | 51.9 |
| 20.1 | 29.8 | 31.1 | 54.3 |
| 12.9 | 19.1 | 30.9 | 42.2 |
| 21.7 | 25.6 | 23.7 | 53.9 |
| 27.1 | 31.4 | 27.6 | 58.5 |
| 25.4 | 27.9 | 30.6 | 52.1 |
| 21.3 | 22.1 | 23.2 | 49.9 |
| 19.3 | 25.5 | 24.8 | 53.5 |
| 25.4 | 31.1 | 30 | 56.6 |
| 27.2 | 30.4 | 28.3 | 56.7 |
| 11.7 | 18.7 | 23 | 46.5 |
| 17.8 | 19.7 | 28.6 | 44.2 |
| 12.8 | 14.6 | 21.3 | 42.7 |
| 23.9 | 29.5 | 30.1 | 54.4 |
| 22.6 | 27.7 | 25.7 | 55.3 |
| 25.4 | 30.2 | 24.6 | 58.6 |
| 14.8 | 22.7 | 27.1 | 48.2 |
| 21.1 | 25.2 | 27.5 | 51 |

Here is the table: