CS544, Fundamentals of Analysis Homework 1

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Part 1. Calculations and manipulations of the ‘rivers’ dataset.

1. 141
2. Mean: 591.2, Median: 425, Mode: 350
3. Variance: 243,908.4, Standard Deviation: 493.9
4. Five number summary:

|  |  |
| --- | --- |
| Min | 135 |
| 1st quartile | 310 |
| Median | 425 |
| 3rd Quartile | 680 |
| Max | 3710 |

The IQR is 370.

The outlier values are: 1054, 1100, 1171, 1205, 1243, 1270, 1306, 1450, 1459, 1770, 1885, 2315,

2348, 2533, 3710

1. The standardized values (scaled to fit the page) are:

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 733.803 | 318.803 | 323.803 | 390.803 | 522.803 | 448.803 | 1457.803 | 133.803 | 463.803 | 598.803 | 328.803 | 334.803 | 278.803 |
| 313.803 | 868.803 | 904.803 | 200.803 | 327.803 | 288.803 | 998.803 | 598.803 | 503.803 | 1448.803 | 838.803 | 1241.803 | 888.803 |
| 348.803 | 405.803 | 284.803 | 278.803 | 523.803 | 718.803 | 388.803 | 248.803 | 325.803 | 228.803 | 263.803 | 848.803 | 208.803 |
| 628.803 | 258.803 | 228.803 | 358.803 | 728.803 | 598.803 | 304.803 | 388.803 | 418.803 | 289.803 | 708.803 | 338.803 | 215.803 |
| 279.803 | 350.803 | 257.803 | 248.803 | 468.803 | 678.803 | 568.803 | 348.803 | 298.803 | 558.803 | 898.803 | 623.803 | 330.803 |
| 2346.803 | 1169.803 | 3708.803 | 2313.803 | 2531.803 | 778.803 | 278.803 | 408.803 | 458.803 | 258.803 | 253.803 | 429.803 | 348.803 |
| 758.803 | 616.803 | 336.803 | 979.803 | 1304.803 | 498.803 | 694.803 | 603.803 | 248.803 | 409.803 | 1052.803 | 733.803 | 231.803 |
| 433.803 | 488.803 | 308.803 | 458.803 | 381.803 | 373.803 | 1268.803 | 543.803 | 443.803 | 1883.803 | 378.803 | 298.803 | 378.803 |
| 375.803 | 423.803 | 274.803 | 208.803 | 798.803 | 418.803 | 348.803 | 358.803 | 536.803 | 1098.803 | 1203.803 | 312.803 | 235.803 |
| 608.803 | 358.803 | 538.803 | 1036.803 | 422.803 | 308.803 | 298.803 | 442.803 | 299.803 | 266.803 | 618.803 | 213.803 | 650.803 |
| 898.803 | 523.803 | 244.803 | 358.803 | 527.803 | 498.803 | 718.803 | 268.803 | 428.803 | 669.803 | 1768.803 |  |  |

1. Load the first 60 data points to a matrix of 2 rows by 30 columns:

> rivers.60;

[,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8] [,9] [,10] [,11] [,12] [,13] [,14] [,15] [,16] [,17] [,18] [,19] [,20] [,21]

[1,] 735 325 524 1459 465 330 280 870 202 290 600 1450 1243 350 286 525 390 327 265 210 260

[2,] 320 392 450 135 600 336 315 906 329 1000 505 840 890 407 280 720 250 230 850 630 230

[,22] [,23] [,24] [,25] [,26] [,27] [,28] [,29] [,30]

[1,] 360 600 390 291 340 281 259 470 570

[2,] 730 306 420 710 217 352 250 680 350

1. The first and last columns of the matrix are:

First: [1] 735 320

Last: [1] 570 350

1. Assign row and column names to the matrix as Row\_n and Length\_n, respectively:

rivers.60

Length\_1 Length\_2 Length\_3 Length\_4 Length\_5 Length\_6 Length\_7 Length\_8 Length\_9 Length\_10 Length\_11 Length\_12

Row\_1 735 325 524 1459 465 330 280 870 202 290 600 1450

Row\_2 320 392 450 135 600 336 315 906 329 1000 505 840

Length\_13 Length\_14 Length\_15 Length\_16 Length\_17 Length\_18 Length\_19 Length\_20 Length\_21 Length\_22 Length\_23

Row\_1 1243 350 286 525 390 327 265 210 260 360 600

Row\_2 890 407 280 720 250 230 850 630 230 730 306

Length\_24 Length\_25 Length\_26 Length\_27 Length\_28 Length\_29 Length\_30

Row\_1 390 291 340 281 259 470 570

Row\_2 420 710 217 352 250 680 350

Part 2. Calculations and manipulations on the Johnson.csv data set.

1. The data was loaded with years (column 1) as row names and column headers as column names:

Qtr1 Qtr2 Qtr3 Qtr4

1960 0.71 0.63 0.85 0.44

1961 0.61 0.69 0.92 0.55

1962 0.72 0.77 0.92 0.60

1963 0.83 0.80 1.00 0.77

1964 0.92 1.00 1.24 1.00

1965 1.16 1.30 1.45 1.25

1966 1.26 1.38 1.86 1.56

1967 1.53 1.59 1.83 1.86

1968 1.53 2.07 2.34 2.25

1969 2.16 2.43 2.70 2.25

1970 2.79 3.42 3.69 3.60

1971 3.60 4.32 4.32 4.05

1972 4.86 5.04 5.04 4.41

1973 5.58 5.85 6.57 5.31

1974 6.03 6.39 6.93 5.85

1975 6.93 7.74 7.83 6.12

1976 7.74 8.91 8.28 6.84

1977 9.54 10.26 9.54 8.73

1978 11.88 12.06 12.15 8.91

1979 14.04 12.96 14.85 9.99

1980 16.20 14.67 16.02 11.61

1. The summary of earnings for each quarter are:

summary(johnson)

Qtr1 Qtr2 Qtr3 Qtr4

Min. : 0.610 Min. : 0.630 Min. : 0.850 Min. : 0.440

1st Qu.: 1.160 1st Qu.: 1.300 1st Qu.: 1.450 1st Qu.: 1.250

Median : 2.790 Median : 3.420 Median : 3.690 Median : 3.600

Mean : 4.791 Mean : 4.966 Mean : 5.254 Mean : 4.188

3rd Qu.: 6.930 3rd Qu.: 7.740 3rd Qu.: 7.830 3rd Qu.: 6.120

Max. :16.200 Max. :14.670 Max. :16.020 Max. :11.610

1. Add a column, Yearly, with annual totals.

Qtr1 Qtr2 Qtr3 Qtr4 Yearly

1960 0.71 0.63 0.85 0.44 2.63

1961 0.61 0.69 0.92 0.55 2.77

1962 0.72 0.77 0.92 0.60 3.01

1963 0.83 0.80 1.00 0.77 3.40

1964 0.92 1.00 1.24 1.00 4.16

1965 1.16 1.30 1.45 1.25 5.16

1966 1.26 1.38 1.86 1.56 6.06

1967 1.53 1.59 1.83 1.86 6.81

1968 1.53 2.07 2.34 2.25 8.19

1969 2.16 2.43 2.70 2.25 9.54

1970 2.79 3.42 3.69 3.60 13.50

1971 3.60 4.32 4.32 4.05 16.29

1972 4.86 5.04 5.04 4.41 19.35

1973 5.58 5.85 6.57 5.31 23.31

1974 6.03 6.39 6.93 5.85 25.20

1975 6.93 7.74 7.83 6.12 28.62

1976 7.74 8.91 8.28 6.84 31.77

1977 9.54 10.26 9.54 8.73 38.07

1978 11.88 12.06 12.15 8.91 45.00

1979 14.04 12.96 14.85 9.99 51.84

1980 16.20 14.67 16.02 11.61 58.50

1. Which were the best and worst performing years, by earnings?:

Qtr1 Qtr2 Qtr3 Qtr4 Yearly

Best: 1980 16.2 14.67 16.02 11.61 58.5

Worst:1960 0.71 0.63 0.85 0.44 2.63

1. Show all rows (Years) with annual earnings greater than 20:

Qtr1 Qtr2 Qtr3 Qtr4 Yearly

1973 5.58 5.85 6.57 5.31 23.31

1974 6.03 6.39 6.93 5.85 25.20

1975 6.93 7.74 7.83 6.12 28.62

1976 7.74 8.91 8.28 6.84 31.77

1977 9.54 10.26 9.54 8.73 38.07

1978 11.88 12.06 12.15 8.91 45.00

1979 14.04 12.96 14.85 9.99 51.84

1980 16.20 14.67 16.02 11.61 58.50