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STAT 600
Dr. Claussen
7/2/21

*Exercise 1.*

| Obs | _TYPE_ | _FREQ_ | _STAT_ | Instrument_1 | Instrument_2 | Instrument_3 | Instrument_4 | Instrument_5 |
|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 5 | N | 5 | 5 | 5 | 5 | 5 |
| 2 | 0 | 5 | MIN | 196.124 | 196.0422 | 196.0343 | 195.9885 | 196.0052 |
| 3 | 0 | 5 | MAX | 196.3403 | 196.3825 | 196.2889 | 196.2795 | 196.2119 |
| 4 | 0 | 5 | MEAN | 196.24308 | 196.2443 | 196.16702 | 196.14814 | 196.14324 |
| 5 | 0 | 5 | STD | 0.0874732931 | 0.1379749796 | 0.0937241271 | 0.1042267384 | 0.0884479678 |

## *Exercise 1.*

Normal Dist - Confidence Bounds for instrument 1 observations

| lower_bound | upper_bound |
|---|---|
| 196.16641 | 196.31975 |

Normal Dist - Confidence Bounds for instrument 2 observations

| lower_bound | upper_bound |
|---|---|
| 196.12336 | 196.36524 |

Normal Dist - Confidence Bounds for instrument 3 observations

| lower_bound | upper_bound |
|---|---|
| 196.08487 | 196.24917 |

Normal Dist - Confidence Bounds for instrument 4 observations

| lower_bound | upper_bound |
|---|---|
| 196.05678 | 196.2395 |

Normal Dist - Confidence Bounds for instrument 5 observations

| lower_bound | upper_bound |
|---|---|
| 196.06571 | 196.22077 |

*Exercise 2.*

| Obs | Rotation | Fertilizer | _TYPE_ | _FREQ_ | mean | sum | std | n |
|---|---|---|---|---|---|---|---|---|
| 1 | | | 0 | 27 | 1.5377777778 | 41.52 | 0.2363599493 | 27 |
| 2 | | HNPK | 1 | 9 | 1.6933333333 | 15.24 | 0.2346832972 | 9 |
| 3 | | NPK | 1 | 9 | 1.46 | 13.14 | 0.2069480611 | 9 |
| 4 | | none | 1 | 9 | 1.46 | 13.14 | 0.2069480611 | 9 |
| 5 | C-C | | 2 | 9 | 1.3393333333 | 12.054 | 0.1985925477 | 9 |
| 6 | C-O(S) | | 2 | 9 | 1.575 | 14.175 | 0.1558901857 | 9 |
| 7 | C-O-H | | 2 | 9 | 1.699 | 15.291 | 0.2066899852 | 9 |
| 8 | C-C | HNPK | 3 | 3 | 1.526 | 4.578 | 0.0465188134 | 3 |
| 9 | C-C | NPK | 3 | 3 | 1.246 | 3.738 | 0.196458647 | 3 |
| 10 | C-C | none | 3 | 3 | 1.246 | 3.738 | 0.196458647 | 3 |
| 11 | C-O(S) | HNPK | 3 | 3 | 1.6683333333 | 5.005 | 0.2433152961 | 3 |
| 12 | C-O(S) | NPK | 3 | 3 | 1.5283333333 | 4.585 | 0.095928793 | 3 |
| 13 | C-O(S) | none | 3 | 3 | 1.5283333333 | 4.585 | 0.095928793 | 3 |
| 14 | C-O-H | HNPK | 3 | 3 | 1.8856666667 | 5.657 | 0.2459925473 | 3 |
| 15 | C-O-H | NPK | 3 | 3 | 1.6056666667 | 4.817 | 0.126433118 | 3 |
| 16 | C-O-H | none | 3 | 3 | 1.6056666667 | 4.817 | 0.126433118 | 3 |

## *Exercise 2.*

### *The MEANS Procedure*

| Variable | N | Mean | Std Dev | Minimum | Maximum |
|---|---|---|---|---|---|
| Mean55 | 27 | 1.5377778 | 0.2363599 | 1.0200000 | 2.1090000 |
| Mean05 | 27 | 1.3251852 | 0.2586691 | 0.7510000 | 1.8870000 |
| SD05 | 27 | 0.0085185 | 0.0028605 | 0.0040000 | 0.0140000 |
| Diff | 27 | -0.2125926 | 0.1443365 | -0.5020000 | 0.0130000 |

## *Categorical Vs Categorical*

### *The FREQ Procedure*

| Table of Rotation by Fertilizer | | | | |
|---|---|---|---|---|
| **Rotation** | **Fertilizer** | | | |
| **Frequency Percent Row Pct Col Pct** | **HNPK** | **NPK** | **none** | **Total** |
| **C-C** | 3<br>11.11<br>33.33<br>33.33 | 3<br>11.11<br>33.33<br>33.33 | 3<br>11.11<br>33.33<br>33.33 | 9<br>33.33 |
| **C-O(S)** | 3<br>11.11<br>33.33<br>33.33 | 3<br>11.11<br>33.33<br>33.33 | 3<br>11.11<br>33.33<br>33.33 | 9<br>33.33 |
| **C-O-H** | 3<br>11.11<br>33.33<br>33.33 | 3<br>11.11<br>33.33<br>33.33 | 3<br>11.11<br>33.33<br>33.33 | 9<br>33.33 |
| **Total** | 9<br>33.33 | 9<br>33.33 | 9<br>33.33 | 27<br>100.00 |

# Categorical Vs Categorical

## The FREQ Procedure



Distribution of Rotation by Fertilizer

Continuous Vs Categorical
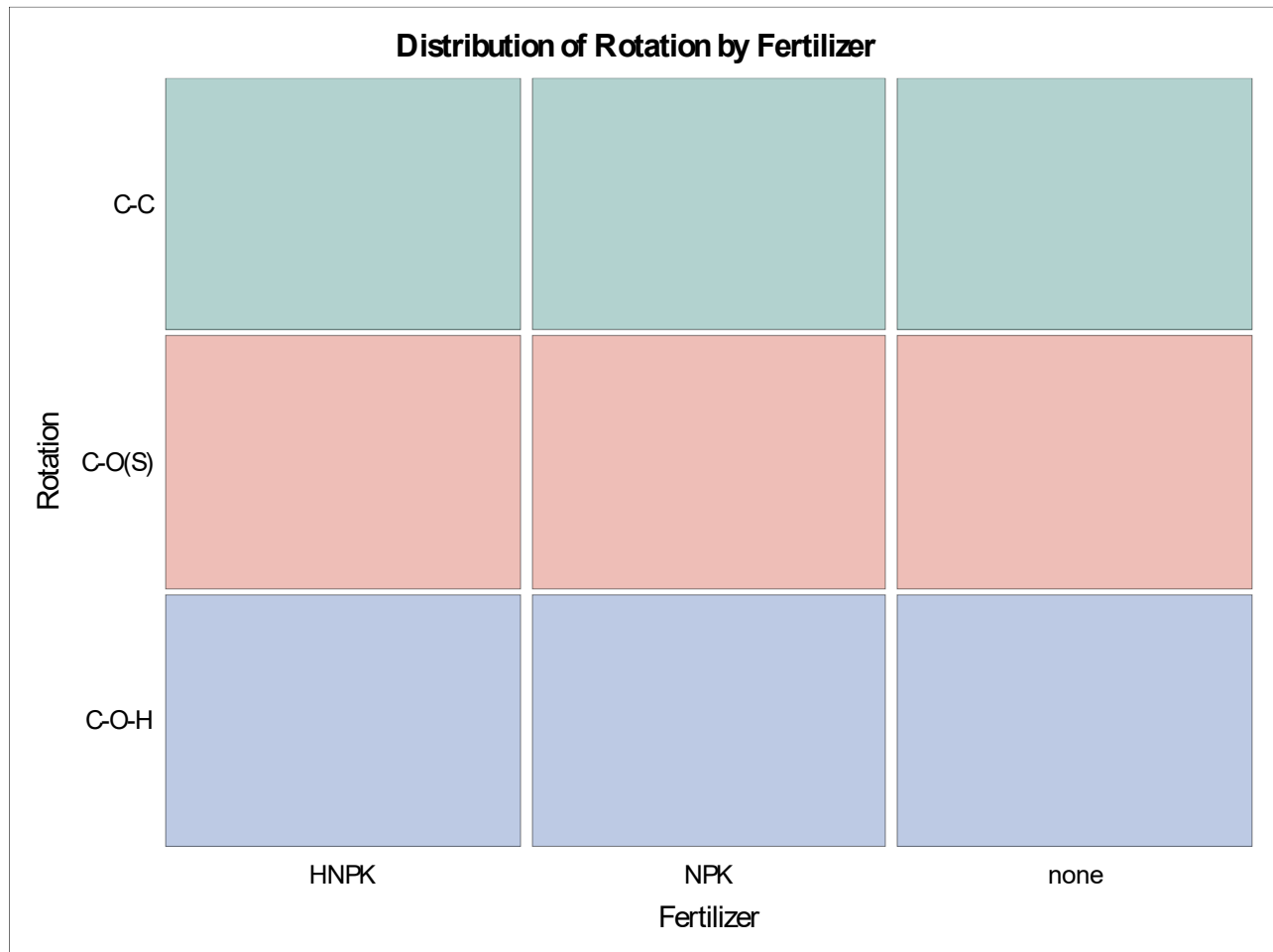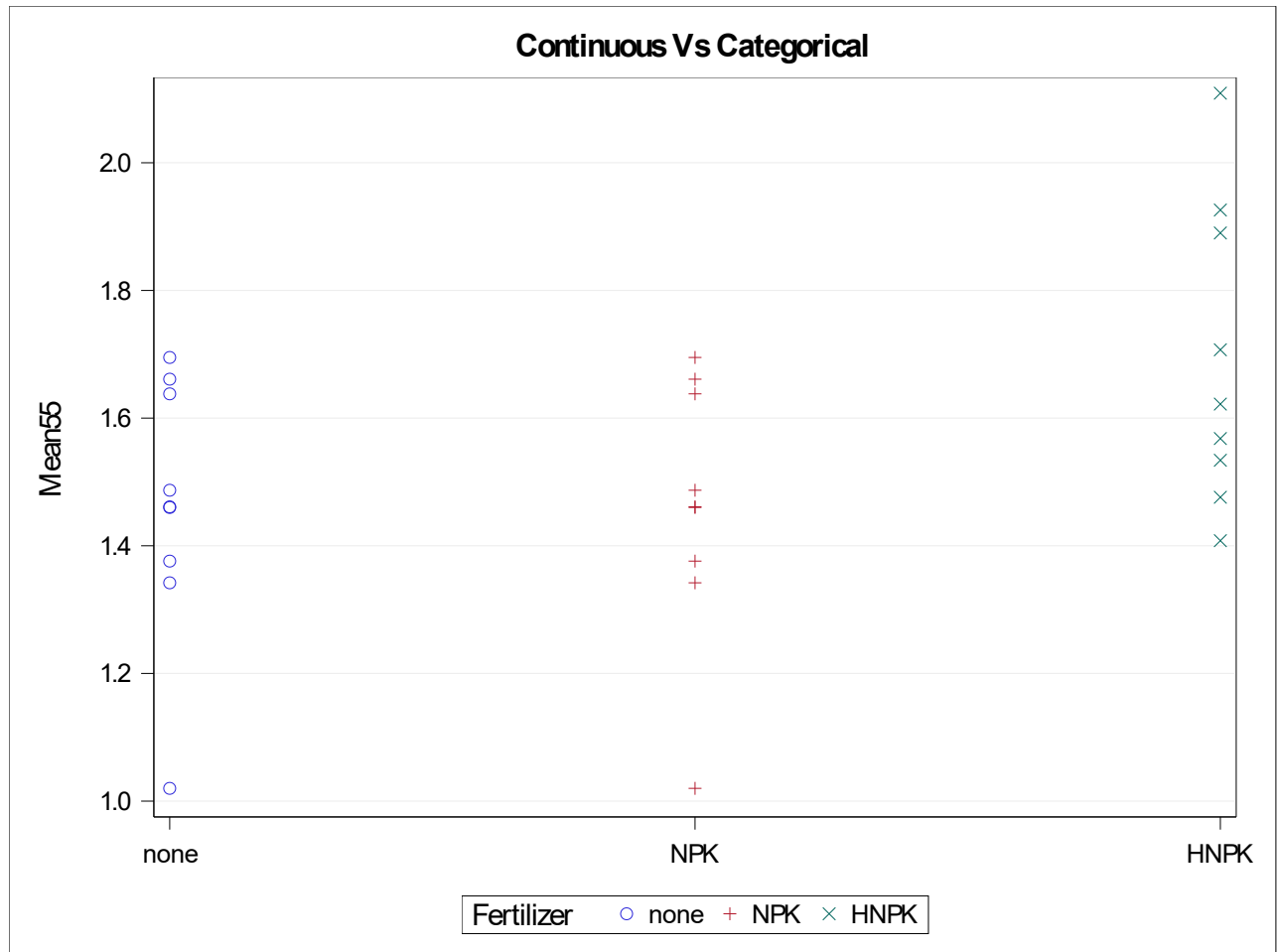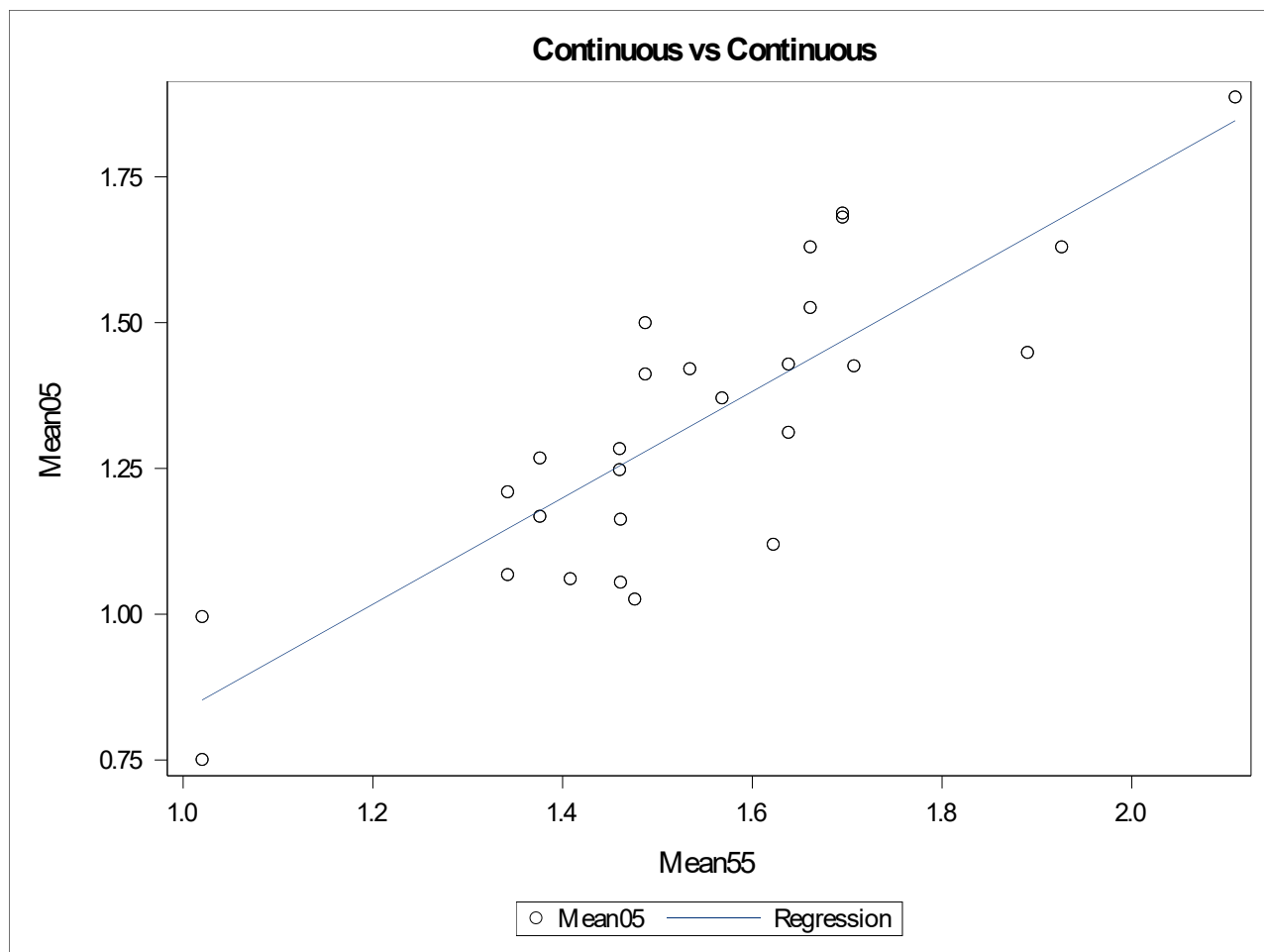
Do you notice anything unusual about the data?

Yes, NPK fertilizer and no fertilizer always have the same results, making it seem like there's an issue with the fertilizer.

*Exercise 3.*

ANOVA GLM Results for Testing

## *Exercise 3.*

### *The GLM Procedure*

| Class Level Information | | |
|---|---|---|
| **Class** | **Levels** | **Values** |
| **Fertilizer** | 3 | HNPK NPK none |

| | |
|---|---|
| **Number of Observations Read** | 27 |
| **Number of Observations Used** | 27 |

*Exercise 3.*

*The GLM Procedure*

*Dependent Variable: CarbonLoss*

| Source | DF | Sum of Squares | Mean Square | F Value | Pr > F |
|---|---|---|---|---|---|
| Model | 2 | 0.15355874 | 0.07677937 | 4.75 | 0.0183 |
| Error | 24 | 0.38809978 | 0.01617082 | | |
| Corrected Total | 26 | 0.54165852 | | | |

| R-Square | Coeff Var | Root MSE | CarbonLoss Mean |
|---|---|---|---|
| 0.283497 | -59.81608 | 0.127165 | -0.212593 |

| Source | DF | Type I SS | Mean Square | F Value | Pr > F |
|---|---|---|---|---|---|
| Fertilizer | 2 | 0.15355874 | 0.07677937 | 4.75 | 0.0183 |

| Source | DF | Type III SS | Mean Square | F Value | Pr > F |
|---|---|---|---|---|---|
| Fertilizer | 2 | 0.15355874 | 0.07677937 | 4.75 | 0.0183 |

# Exercise 3.

## The GLM Procedure

## Dependent Variable: CarbonLoss
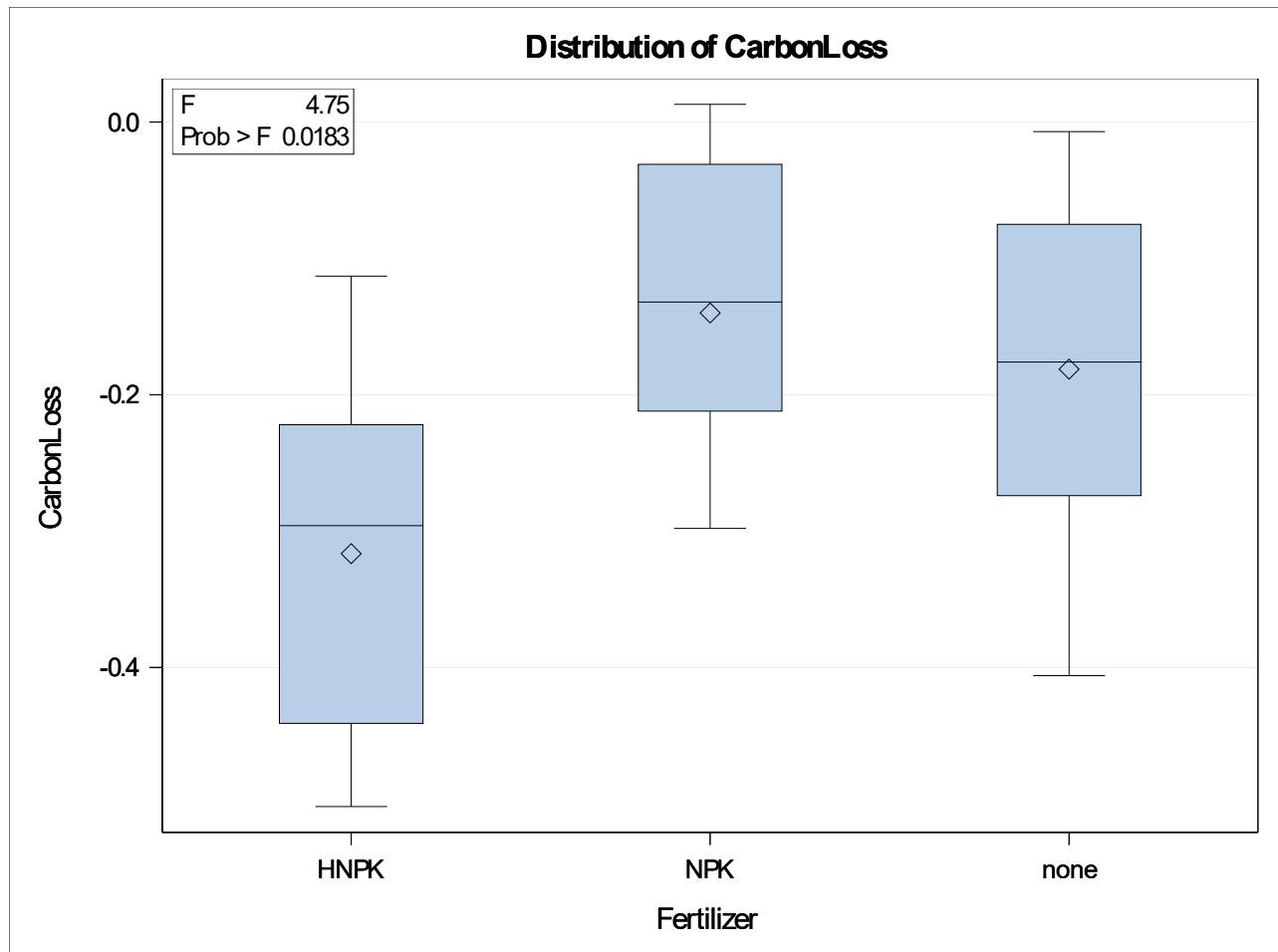
## *Exercise 3.*

part A

*Exercise 3.*

| Obs | Fertilizer | Treatment_Val |
|---|---|---|
| 1 | HNPK | -2.849 |
| 2 | NPK | -1.260 |
| 3 | none | -1.631 |

| Obs | Fertilizer | Treatment_Val |
|---|---|---|
| 1 | HNPK | -2.849 |

*Exercise 3.*

| Obs | Fertilizer | Observations_Val |
|---|---|---|
| 1 | HNPK | 9 |
| 2 | NPK | 9 |
| 3 | none | 9 |

*Exercise 3.*

| Obs | GrandTotal_Val | Mean05 | Mean55 |
|---|---|---|---|
| 1 | -5.74 | 1.168 | 1.376 |
| 2 | -5.74 | 1.068 | 1.342 |
| 3 | -5.74 | 0.996 | 1.02 |
| 4 | -5.74 | 1.268 | 1.376 |
| 5 | -5.74 | 1.21 | 1.342 |
| 6 | -5.74 | 0.751 | 1.02 |
| 7 | -5.74 | 1.421 | 1.534 |
| 8 | -5.74 | 1.371 | 1.568 |
| 9 | -5.74 | 1.026 | 1.476 |
| 10 | -5.74 | 1.412 | 1.487 |
| 11 | -5.74 | 1.312 | 1.638 |
| 12 | -5.74 | 1.284 | 1.46 |
| 13 | -5.74 | 1.5 | 1.487 |
| 14 | -5.74 | 1.429 | 1.638 |
| 15 | -5.74 | 1.248 | 1.46 |
| 16 | -5.74 | 1.449 | 1.89 |
| 17 | -5.74 | 1.426 | 1.707 |
| 18 | -5.74 | 1.061 | 1.408 |
| 19 | -5.74 | 1.688 | 1.695 |
| 20 | -5.74 | 1.526 | 1.661 |
| 21 | -5.74 | 1.055 | 1.461 |
| 22 | -5.74 | 1.681 | 1.695 |
| 23 | -5.74 | 1.63 | 1.661 |
| 24 | -5.74 | 1.163 | 1.461 |
| 25 | -5.74 | 1.887 | 2.109 |
| 26 | -5.74 | 1.63 | 1.926 |
| 27 | -5.74 | 1.12 | 1.622 |

## *Exercise 3.*

| Correction_val |
|:---:|
| 1.2202815 |

| Total_SS_Val |
|:---:|
| 8.7037176 |

| treatments_SS_Val |
|---:|
| -31.18566 |

| Residual_SS_Val |
|---:|
| 39.889378 |

| MSB | MSW |
|---:|---:|
| -3.898208 | 2.2160765 |

| f_Ratio | p_Value |
|---:|---:|
| -1.759058 | 1 |

The press release associated with this paper
(https://aces.illinois.edu/news/study-reveals-nitrogen-fertilizersdeplete-soil-organic-carbon) claims that "Study Reveals that Nitrogen Fertilizers Deplete Soil Organic Carbon".
Do these data support that claim?

Yes, according to the correct calculations given by the glm proc in SAS (I believe my calculations are incorrect), as their p value is below .01, indicating a significant change in the means of the data.

*Exercise 4.*

| Obs | ExpectedFinish | ActualFinish | _TYPE_ | _FREQ_ | mean | sum | std | n |
|-----|----------------|--------------|--------|--------|------|-----|-----|---|
| 1 | | | 0 | 329 | 1378.7764742 | 453617.46 | 56.505968919 | 329 |
| 2 | | AA | 1 | 80 | 1444.5565 | 115564.52 | 50.932854287 | 80 |
| 3 | | cons 12 | 1 | 40 | 1400.708 | 56028.32 | 29.226326751 | 40 |
| 4 | | cons 16 | 1 | 40 | 1371.7455 | 54869.82 | 34.288611846 | 40 |
| 5 | | cons 24 | 1 | 79 | 1355.13 | 107055.27 | 30.951254976 | 79 |
| 6 | | cons 32 | 1 | 80 | 1333.26975 | 106661.58 | 34.085632668 | 80 |
| 7 | | cons 33 | 1 | 10 | 1343.795 | 13437.95 | 28.305876991 | 10 |
| 8 | E[AA] | | 2 | 80 | 1451.336125 | 116106.89 | 41.049777393 | 80 |
| 9 | E[NQ] | | 2 | 65 | 1332.8206154 | 86633.34 | 52.692723848 | 65 |
| 10 | E[cons 12] | | 2 | 36 | 1395.4422222 | 50235.92 | 17.777675103 | 36 |
| 11 | E[cons 16] | | 2 | 36 | 1379.4044444 | 49658.56 | 13.115927818 | 36 |
| 12 | E[cons 24] | | 2 | 66 | 1357.3690909 | 89586.36 | 16.022819086 | 66 |
| 13 | E[cons 32] | | 2 | 46 | 1334.7041304 | 61396.39 | 18.020511224 | 46 |
| 14 | E[AA] | AA | 3 | 57 | 1460.8380702 | 83267.77 | 43.105974414 | 57 |
| 15 | E[AA] | cons 12 | 3 | 13 | 1430.3792308 | 18594.93 | 20.615632605 | 13 |
| 16 | E[AA] | cons 16 | 3 | 7 | 1420.9985714 | 9946.99 | 23.146888508 | 7 |
| 17 | E[AA] | cons 24 | 3 | 3 | 1432.4 | 4297.2 | 34.480311774 | 3 |
| 18 | E[NQ] | AA | 3 | 6 | 1441.62 | 8649.72 | 73.584323059 | 6 |
| 19 | E[NQ] | cons 12 | 3 | 3 | 1392.2166667 | 4176.65 | 25.793759581 | 3 |
| 20 | E[NQ] | cons 16 | 3 | 8 | 1343.9925 | 10751.94 | 25.593999715 | 8 |
| 21 | E[NQ] | cons 24 | 3 | 12 | 1326.4541667 | 15917.45 | 29.551989153 | 12 |
| 22 | E[NQ] | cons 32 | 3 | 33 | 1307.9163636 | 43161.24 | 30.84223462 | 33 |
| 23 | E[NQ] | cons 33 | 3 | 3 | 1325.4466667 | 3976.34 | 21.668886297 | 3 |
| 24 | E[cons 12] | AA | 3 | 9 | 1399.3411111 | 12594.07 | 28.175198954 | 9 |
| 25 | E[cons 12] | cons 12 | 3 | 13 | 1398.1584615 | 18176.06 | 15.904033475 | 13 |
| 26 | E[cons 12] | cons 16 | 3 | 4 | 1393.865 | 5575.46 | 7.959164529 | 4 |
| 27 | E[cons 12] | cons 24 | 3 | 8 | 1386.37 | 11090.96 | 7.9619739118 | 8 |
| 28 | E[cons 12] | cons 32 | 3 | 2 | 1399.685 | 2799.37 | 10.231835124 | 2 |
| 29 | E[cons 16] | AA | 3 | 6 | 1384.7216667 | 8308.33 | 19.830834997 | 6 |
| 30 | E[cons 16] | cons 12 | 3 | 5 | 1380.396 | 6901.98 | 14.232007237 | 5 |
| 31 | E[cons 16] | cons 16 | 3 | 7 | 1383.5014286 | 9684.51 | 12.402933025 | 7 |
| 32 | E[cons 16] | cons 24 | 3 | 11 | 1377.4054545 | 15151.46 | 8.5795377074 | 11 |
| 33 | E[cons 16] | cons 32 | 3 | 6 | 1373.07 | 8238.42 | 13.984818912 | 6 |
| 34 | E[cons 16] | cons 33 | 3 | 1 | 1373.86 | 1373.86 | . | 1 |
| 35 | E[cons 24] | AA | 3 | 1 | 1374.8 | 1374.8 | . | 1 |

*Exercise 4.*

| Obs | ExpectedFinish | ActualFinish | _TYPE_ | _FREQ_ | mean | sum | std | n |
|---|---|---|---|---|---|---|---|---|
| 36 | E[cons 24] | cons 12 | 3 | 6 | 1363.1166667 | 8178.7 | 12.243280062 | 6 |
| 37 | E[cons 24] | cons 16 | 3 | 8 | 1357.58 | 10860.64 | 20.271388 | 8 |
| 38 | E[cons 24] | cons 24 | 3 | 29 | 1356.3837931 | 39335.13 | 14.353598208 | 29 |
| 39 | E[cons 24] | cons 32 | 3 | 17 | 1356.0058824 | 23052.1 | 17.548825836 | 17 |
| 40 | E[cons 24] | cons 33 | 3 | 5 | 1356.998 | 6784.99 | 21.228325888 | 5 |
| 41 | E[cons 32] | AA | 3 | 1 | 1369.83 | 1369.83 | . | 1 |
| 42 | E[cons 32] | cons 16 | 3 | 6 | 1341.7133333 | 8050.28 | 13.991385445 | 6 |
| 43 | E[cons 32] | cons 24 | 3 | 16 | 1328.941875 | 21263.07 | 15.759997554 | 16 |
| 44 | E[cons 32] | cons 32 | 3 | 22 | 1336.8386364 | 29410.45 | 17.899548091 | 22 |
| 45 | E[cons 32] | cons 33 | 3 | 1 | 1302.76 | 1302.76 | . | 1 |

*Exercise 4.*

| Obs | Weight | Conference | _TYPE_ | _FREQ_ | mean | sum | std | n |
|---|---|---|---|---|---|---|---|---|
| 1 | . | | 0 | 329 | 1378.7764742 | 453617.46 | 56.505968919 | 329 |
| 2 | . | ACC | 1 | 40 | 1377.845 | 55113.8 | 52.292651344 | 40 |
| 3 | . | Big 12 | 1 | 52 | 1368.4309615 | 71158.41 | 45.295064712 | 52 |
| 4 | . | Big Ten | 1 | 87 | 1407.6717241 | 122467.44 | 66.775089514 | 87 |
| 5 | . | EIWA | 1 | 55 | 1377.5034545 | 75762.69 | 43.382498016 | 55 |
| 6 | . | EWL | 1 | 22 | 1361.5722727 | 29954.59 | 44.681376107 | 22 |
| 7 | . | MAC | 1 | 34 | 1358.4820588 | 46188.39 | 53.235284083 | 34 |
| 8 | . | Pac 12 | 1 | 25 | 1375.4964 | 34387.41 | 51.982750334 | 25 |
| 9 | . | SoCon | 1 | 14 | 1327.4807143 | 18584.73 | 33.572385279 | 14 |
| 10 | 125 | | 2 | 33 | 1383.1133333 | 45642.74 | 58.640708112 | 33 |
| 11 | 133 | | 2 | 33 | 1382.879697 | 45635.03 | 47.02196385 | 33 |
| 12 | 141 | | 2 | 33 | 1382.6866667 | 45628.66 | 52.119641851 | 33 |
| 13 | 149 | | 2 | 33 | 1382.3236364 | 45616.68 | 62.182808156 | 33 |
| 14 | 157 | | 2 | 33 | 1396.6984848 | 46091.05 | 48.970399932 | 33 |
| 15 | 165 | | 2 | 33 | 1393.4842424 | 45984.98 | 58.775604954 | 33 |
| 16 | 174 | | 2 | 33 | 1389.400303 | 45850.21 | 56.583985449 | 33 |
| 17 | 184 | | 2 | 33 | 1360.189697 | 44886.26 | 58.236464816 | 33 |
| 18 | 197 | | 2 | 32 | 1357.3528125 | 43435.29 | 47.558622517 | 32 |
| 19 | 285 | | 2 | 33 | 1358.9866667 | 44846.56 | 62.467214884 | 33 |
| 20 | 125 | ACC | 3 | 3 | 1378.0466667 | 4134.14 | 27.964828505 | 3 |
| 21 | 125 | Big 12 | 3 | 7 | 1366.5042857 | 9565.53 | 35.905557999 | 7 |
| 22 | 125 | Big Ten | 3 | 10 | 1425.912 | 14259.12 | 67.46736607 | 10 |
| 23 | 125 | EIWA | 3 | 2 | 1393.295 | 2786.59 | 117.99490858 | 2 |
| 24 | 125 | EWL | 3 | 3 | 1344.51 | 4033.53 | 54.640775983 | 3 |
| 25 | 125 | MAC | 3 | 3 | 1356.09 | 4068.27 | 27.20105145 | 3 |
| 26 | 125 | Pac 12 | 3 | 4 | 1370.24 | 5480.96 | 44.153771451 | 4 |
| 27 | 125 | SoCon | 3 | 1 | 1314.6 | 1314.6 | . | 1 |
| 28 | 133 | ACC | 3 | 6 | 1387.7433333 | 8326.46 | 47.049123548 | 6 |
| 29 | 133 | Big 12 | 3 | 6 | 1401.12 | 8406.72 | 63.339371326 | 6 |
| 30 | 133 | Big Ten | 3 | 8 | 1381.27375 | 11050.19 | 50.612176101 | 8 |
| 31 | 133 | EIWA | 3 | 4 | 1409.3525 | 5637.41 | 35.865025094 | 4 |
| 32 | 133 | EWL | 3 | 1 | 1372.13 | 1372.13 | . | 1 |
| 33 | 133 | MAC | 3 | 4 | 1371.495 | 5485.98 | 18.634894687 | 4 |
| 34 | 133 | Pac 12 | 3 | 3 | 1347.9966667 | 4043.99 | 35.676028834 | 3 |
| 35 | 133 | SoCon | 3 | 1 | 1312.15 | 1312.15 | . | 1 |

*Exercise 4.*

| Obs | Weight | Conference | _TYPE_ | _FREQ_ | mean | sum | std | n |
|---|---|---|---|---|---|---|---|---|
| 36 | 141 | ACC | 3 | 4 | 1379.7375 | 5518.95 | 56.595583087 | 4 |
| 37 | 141 | Big 12 | 3 | 4 | 1405.8025 | 5623.21 | 63.051810111 | 4 |
| 38 | 141 | Big Ten | 3 | 10 | 1383.118 | 13831.18 | 49.49813056 | 10 |
| 39 | 141 | EIWA | 3 | 4 | 1413.8575 | 5655.43 | 47.773642925 | 4 |
| 40 | 141 | EWL | 3 | 4 | 1362.8925 | 5451.57 | 32.374858944 | 4 |
| 41 | 141 | MAC | 3 | 4 | 1385.7 | 5542.8 | 76.615798632 | 4 |
| 42 | 141 | Pac 12 | 3 | 2 | 1343.265 | 2686.53 | 30.158104218 | 2 |
| 43 | 141 | SoCon | 3 | 1 | 1318.99 | 1318.99 | . | 1 |
| 44 | 149 | ACC | 3 | 4 | 1360.5 | 5442 | 23.780068685 | 4 |
| 45 | 149 | Big 12 | 3 | 7 | 1356.46 | 9495.22 | 48.619901961 | 7 |
| 46 | 149 | Big Ten | 3 | 10 | 1413.824 | 14138.24 | 80.785916567 | 10 |
| 47 | 149 | EIWA | 3 | 5 | 1381.73 | 6908.65 | 55.766138023 | 5 |
| 48 | 149 | EWL | 3 | 2 | 1368.02 | 2736.04 | 72.351165851 | 2 |
| 49 | 149 | MAC | 3 | 3 | 1397.1266667 | 4191.38 | 45.373296479 | 3 |
| 50 | 149 | Pac 12 | 3 | 1 | 1415.73 | 1415.73 | . | 1 |
| 51 | 149 | SoCon | 3 | 1 | 1289.42 | 1289.42 | . | 1 |
| 52 | 157 | ACC | 3 | 4 | 1413.52 | 5654.08 | 47.409417489 | 4 |
| 53 | 157 | Big 12 | 3 | 3 | 1377.1 | 4131.3 | 6.4780629821 | 3 |
| 54 | 157 | Big Ten | 3 | 8 | 1444.9425 | 11559.54 | 59.624353785 | 8 |
| 55 | 157 | EIWA | 3 | 7 | 1377.3371429 | 9641.36 | 16.320260123 | 7 |
| 56 | 157 | EWL | 3 | 2 | 1352.995 | 2705.99 | 6.3851742341 | 2 |
| 57 | 157 | MAC | 3 | 4 | 1374.4675 | 5497.87 | 50.958136004 | 4 |
| 58 | 157 | Pac 12 | 3 | 4 | 1387.825 | 5551.3 | 35.310975159 | 4 |
| 59 | 157 | SoCon | 3 | 1 | 1349.61 | 1349.61 | . | 1 |
| 60 | 165 | ACC | 3 | 3 | 1394.7566667 | 4184.27 | 63.391043794 | 3 |
| 61 | 165 | Big 12 | 3 | 6 | 1370.8016667 | 8224.81 | 46.087962601 | 6 |
| 62 | 165 | Big Ten | 3 | 11 | 1425.2390909 | 15677.63 | 64.579249989 | 11 |
| 63 | 165 | EIWA | 3 | 6 | 1371.9866667 | 8231.92 | 29.22791109 | 6 |
| 64 | 165 | EWL | 3 | 2 | 1452.18 | 2904.36 | 25.964961005 | 2 |
| 65 | 165 | MAC | 3 | 2 | 1339.265 | 2678.53 | 37.172603487 | 2 |
| 66 | 165 | Pac 12 | 3 | 1 | 1443.66 | 1443.66 | . | 1 |
| 67 | 165 | SoCon | 3 | 2 | 1319.9 | 2639.8 | 27.987286399 | 2 |
| 68 | 174 | ACC | 3 | 5 | 1373.32 | 6866.6 | 39.91400005 | 5 |
| 69 | 174 | Big 12 | 3 | 5 | 1385.432 | 6927.16 | 31.218633378 | 5 |
| 70 | 174 | Big Ten | 3 | 8 | 1413.86125 | 11310.89 | 78.501077233 | 8 |

*Exercise 4.*

| Obs | Weight | Conference | _TYPE_ | _FREQ_ | mean | sum | std | n |
|-----|--------|------------|--------|--------|------|-----|-----|---|
| 71 | 174 | EIWA | 3 | 7 | 1368.3585714 | 9578.51 | 31.596114439 | 7 |
| 72 | 174 | EWL | 3 | 2 | 1351.545 | 2703.09 | 18.787827176 | 2 |
| 73 | 174 | MAC | 3 | 3 | 1400.8766667 | 4202.63 | 76.798886277 | 3 |
| 74 | 174 | Pac 12 | 3 | 2 | 1452.41 | 2904.82 | 96.788776209 | 2 |
| 75 | 174 | SoCon | 3 | 1 | 1356.51 | 1356.51 | . | 1 |
| 76 | 184 | ACC | 3 | 3 | 1402.3733333 | 4207.12 | 28.524127214 | 3 |
| 77 | 184 | Big 12 | 3 | 5 | 1343.99 | 6719.95 | 27.1530339 | 5 |
| 78 | 184 | Big Ten | 3 | 9 | 1392.4033333 | 12531.63 | 79.896149939 | 9 |
| 79 | 184 | EIWA | 3 | 7 | 1361.2714286 | 9528.9 | 40.10977247 | 7 |
| 80 | 184 | EWL | 3 | 2 | 1334.08 | 2668.16 | 26.148808768 | 2 |
| 81 | 184 | MAC | 3 | 4 | 1299.12 | 5196.48 | 41.726550301 | 4 |
| 82 | 184 | Pac 12 | 3 | 1 | 1301.33 | 1301.33 | . | 1 |
| 83 | 184 | SoCon | 3 | 2 | 1366.345 | 2732.69 | 38.784806948 | 2 |
| 84 | 197 | ACC | 3 | 2 | 1419.44 | 2838.88 | 17.819090886 | 2 |
| 85 | 197 | Big 12 | 3 | 6 | 1335.87 | 8015.22 | 37.131731982 | 6 |
| 86 | 197 | Big Ten | 3 | 6 | 1371.8566667 | 8231.14 | 41.048214902 | 6 |
| 87 | 197 | EIWA | 3 | 7 | 1388.7342857 | 9721.14 | 41.466395976 | 7 |
| 88 | 197 | EWL | 3 | 1 | 1298.83 | 1298.83 | . | 1 |
| 89 | 197 | MAC | 3 | 3 | 1360.0566667 | 4080.17 | 46.622271859 | 3 |
| 90 | 197 | Pac 12 | 3 | 4 | 1335.1275 | 5340.51 | 36.077384768 | 4 |
| 91 | 197 | SoCon | 3 | 3 | 1303.1333333 | 3909.4 | 38.956227144 | 3 |
| 92 | 285 | ACC | 3 | 6 | 1323.55 | 7941.3 | 75.89679677 | 6 |
| 93 | 285 | Big 12 | 3 | 3 | 1349.7633333 | 4049.29 | 24.066527239 | 3 |
| 94 | 285 | Big Ten | 3 | 7 | 1411.1257143 | 9877.88 | 75.895161211 | 7 |
| 95 | 285 | EIWA | 3 | 6 | 1345.4633333 | 8072.78 | 51.276426033 | 6 |
| 96 | 285 | EWL | 3 | 3 | 1360.2966667 | 4080.89 | 35.546463021 | 3 |
| 97 | 285 | MAC | 3 | 4 | 1311.07 | 5244.28 | 10.786457559 | 4 |
| 98 | 285 | Pac 12 | 3 | 3 | 1406.1933333 | 4218.58 | 16.252954603 | 3 |
| 99 | 285 | SoCon | 3 | 1 | 1361.56 | 1361.56 | . | 1 |

## *Exercise 4.*

### *The MEANS Procedure*

| Analysis Variable : ELO | | | | |
|---|---|---|---|---|
| N | Mean | Std Dev | Minimum | Maximum |
| 329 | 1378.78 | 56.5059689 | 1227.70 | 1583.73 |

## *Exercise 4.*

ANSWER: What are the mean and standard deviations of ELO by ExpectedFinish and by ActualFinish?

*Exercise 4.*

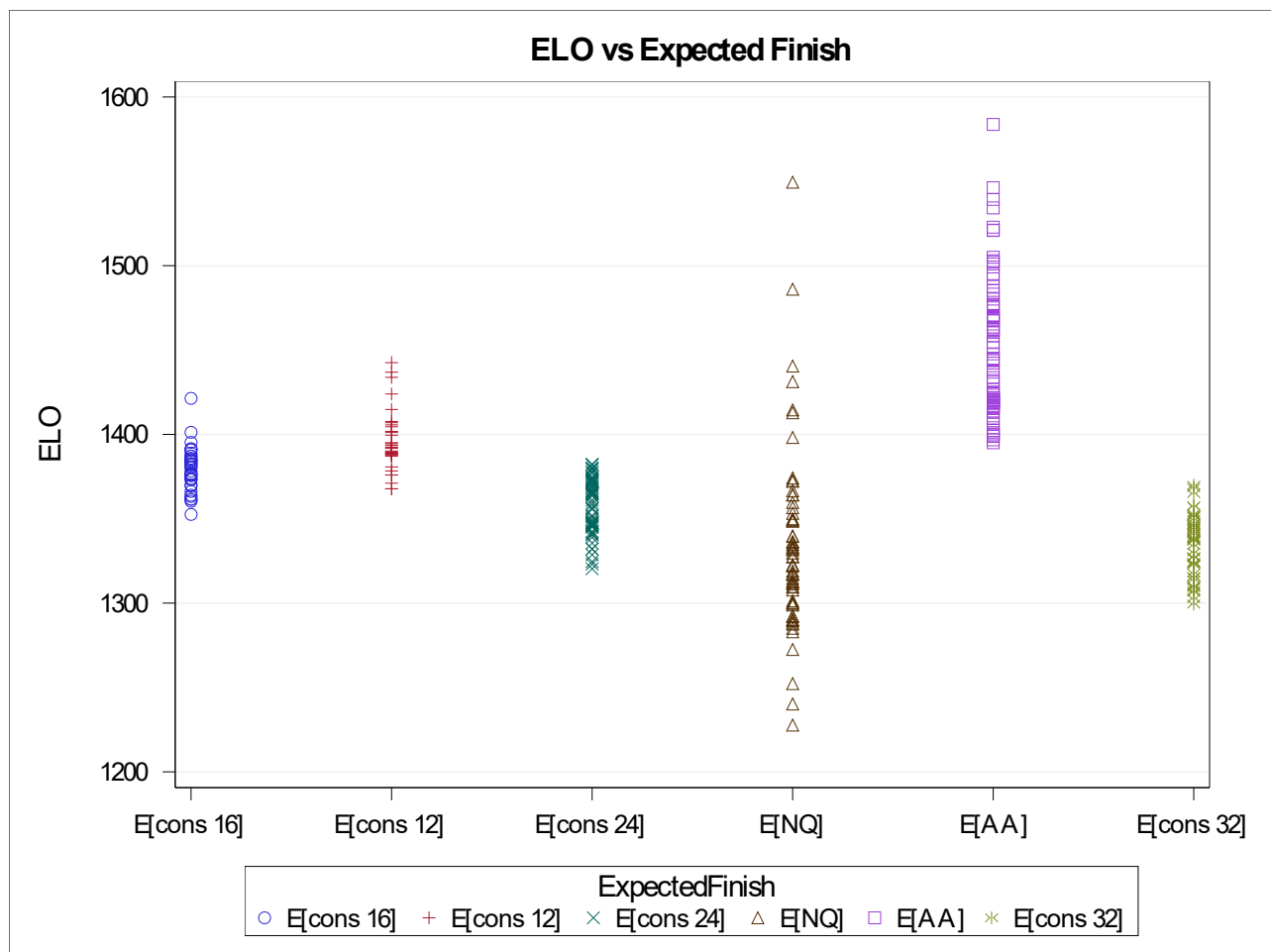| Obs | ExpectedFinish | ActualFinish | _TYPE_ | _FREQ_ | mean | sum | std | n |
|---|---|---|---|---|---|---|---|---|
| 1 | | | 0 | 329 | 1378.7764742 | 453617.46 | 56.505968919 | 329 |
| 2 | | AA | 1 | 80 | 1444.5565 | 115564.52 | 50.932854287 | 80 |
| 3 | | cons 12 | 1 | 40 | 1400.708 | 56028.32 | 29.226326751 | 40 |
| 4 | | cons 16 | 1 | 40 | 1371.7455 | 54869.82 | 34.288611846 | 40 |
| 5 | | cons 24 | 1 | 79 | 1355.13 | 107055.27 | 30.951254976 | 79 |
| 6 | | cons 32 | 1 | 80 | 1333.26975 | 106661.58 | 34.085632668 | 80 |
| 7 | | cons 33 | 1 | 10 | 1343.795 | 13437.95 | 28.305876991 | 10 |
| 8 | E[AA] | | 2 | 80 | 1451.336125 | 116106.89 | 41.049777393 | 80 |
| 9 | E[NQ] | | 2 | 65 | 1332.8206154 | 86633.34 | 52.692723848 | 65 |
| 10 | E[cons 12] | | 2 | 36 | 1395.4422222 | 50235.92 | 17.777675103 | 36 |
| 11 | E[cons 16] | | 2 | 36 | 1379.4044444 | 49658.56 | 13.115927818 | 36 |
| 12 | E[cons 24] | | 2 | 66 | 1357.3690909 | 89586.36 | 16.022819086 | 66 |
| 13 | E[cons 32] | | 2 | 46 | 1334.7041304 | 61396.39 | 18.020511224 | 46 |

# *Exercise 4.*

Do all conferences have similar quality, or might we suspect one or more conferences have better wrestlers than the rest? That is, what is the relationship between Conference and ELO?

ANSWER: Big 10 has a higher mean elo, higher standard deviation on their elo, and more players than the other conferences. This shows that that their players have a tendency to be a higher elo than the other conferences. The other conferences are a lot more similar in mean ELO.

## *Exercise 4.*

How well does ELO predict finish? That is, what is the relationship between ExpectedFinish and ActualFinish? Use a contingency table or mosaic plot to show how often, say, an E[AA] finish corresponds to an AA finish.

ANSWER: Going by the results of this mosaic, most players who are expected to get to AA(top 8) tend to actually get their but results seem to be a lot less consistent for lower placings.

ELO vs Expected Finish

## *ELO vs Expected Finish*

ANSWER: Going by this scatter plot results, players in higher ELOs have a tendency to be expected ot finish in AA(1st-8th place).
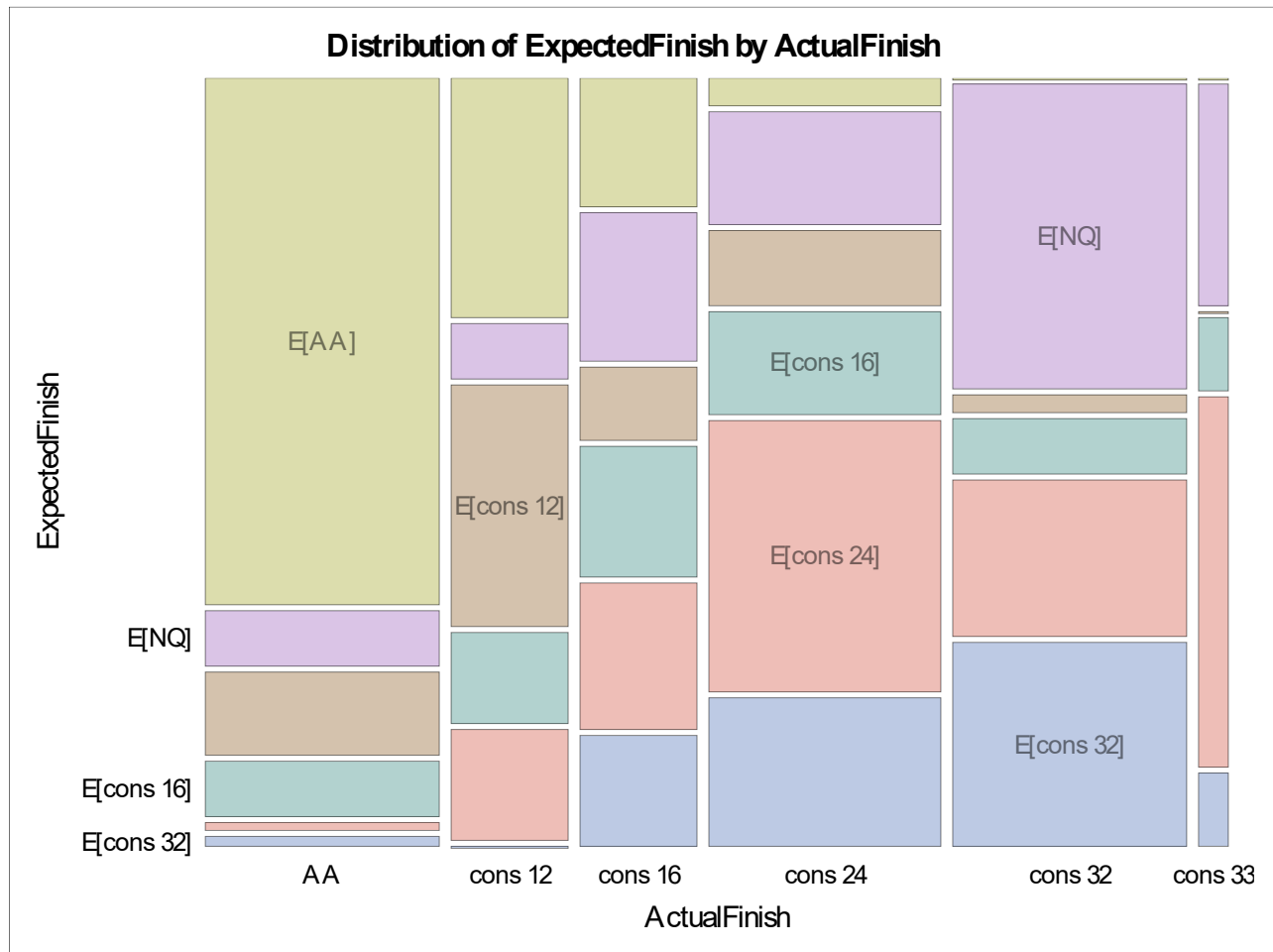
*Expected Finish Vs Actual Finish*

*The FREQ Procedure*

| Table of ExpectedFinish by ActualFinish | | | | | | | |
|---|---|---|---|---|---|---|---|
| **ExpectedFinish** | **ActualFinish** | | | | | | |
| **Frequency Percent Row Pct Col Pct** | **AA** | **cons 12** | **cons 16** | **cons 24** | **cons 32** | **cons 33** | **Total** |
| **E[AA]** | 57 17.33 71.25 71.25 | 13 3.95 16.25 32.50 | 7 2.13 8.75 17.50 | 3 0.91 3.75 3.80 | 0 0.00 0.00 0.00 | 0 0.00 0.00 0.00 | 80 24.32 |
| **E[NQ]** | 6 1.82 9.23 7.50 | 3 0.91 4.62 7.50 | 8 2.43 12.31 20.00 | 12 3.65 18.46 15.19 | 33 10.03 50.77 41.25 | 3 0.91 4.62 30.00 | 65 19.76 |
| **E[cons 12]** | 9 2.74 25.00 11.25 | 13 3.95 36.11 32.50 | 4 1.22 11.11 10.00 | 8 2.43 22.22 10.13 | 2 0.61 5.56 2.50 | 0 0.00 0.00 0.00 | 36 10.94 |
| **E[cons 16]** | 6 1.82 16.67 7.50 | 5 1.52 13.89 12.50 | 7 2.13 19.44 17.50 | 11 3.34 30.56 13.92 | 6 1.82 16.67 7.50 | 1 0.30 2.78 10.00 | 36 10.94 |
| **E[cons 24]** | 1 0.30 1.52 1.25 | 6 1.82 9.09 15.00 | 8 2.43 12.12 20.00 | 29 8.81 43.94 36.71 | 17 5.17 25.76 21.25 | 5 1.52 7.58 50.00 | 66 20.06 |
| **E[cons 32]** | 1 0.30 2.17 1.25 | 0 0.00 0.00 0.00 | 6 1.82 13.04 15.00 | 16 4.86 34.78 20.25 | 22 6.69 47.83 27.50 | 1 0.30 2.17 10.00 | 46 13.98 |
| **Total** | 80 24.32 | 40 12.16 | 40 12.16 | 79 24.01 | 80 24.32 | 10 3.04 | 329 100.00 |

# Expected Finish Vs Actual Finish

## The FREQ Procedure



Distribution of ExpectedFinish by ActualFinish

## *Expected Finish Vs Actual Finish*

Does this data set include non-qualifiers? (The NCAA tournament only allows 33 wrestlers per weight class

ANSWER: No, going by the summary results, there are at most 33 players per weight class in this dataset.