Assignment 4

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Introduction

Interested in studying the effects of stress on exam performance, a psychologist created a

questionnaire (Exam Anxiety Questionnaire or EAQ) to measure anxiety related to exams (Field,

2013). This scale generated a rate of anxiety out of 100. Anxiety is measured before an exam,

and the percentage mark of each student on the exam is used to assess exam performance. This

paper analyzed existing data to determine if anxiety had a negative effect on exam performance

and if there was a significant difference between males and females. It also examined if

participants who have a history of anxiety consistently scored lower on the exam.

Null Hypothesis (Ho): There is no statistically significant relationship between Exam

Anxiety and Exam Performance for students.

Alternative Hypothesis (Ha): There is a statistically significant relationship between

Exam Anxiety and Exam Performance for students.

The Data Set

For this project, the data set entitled ExamAnxiety (Field, 2013) was used to investigate

exam performance based on the level of anxiety between males and females. The set contains

information on anxiety levels and exam performance for 103 participants (N = 103). The

categorical variables for this study are Gender (male or female) and a History of Anxiety (yes or

no). The two quantitative variables are Exam Performance and Exam Anxiety.

Summary Statistics

Summary statistics for two chosen variables are as follows (Table 1). With the N of 103

and no missing values, the mean of Exam Performance is 56.57. The median is 60.00. Multiple

modes exist for Exam Performance. The smallest value is 70. Exam Performance has a standard

deviation of 25.94. The maximum Exam Performance percentage is 100, and the minimum is 2.

The mean of Exam Anxiety is 74.34. The median is 79.04. Multiple modes exist for Exam

Anxiety. The smallest value is 82.27. Exam Anxiety has a standard deviation of 17.18. The

maximum for Exam Anxiety is 97.58, and the minimum is .06. It shows that participants scored

an average of 57 percent on the exam and had elevated levels of exam anxiety. The frequency

chart for Gender (Table 2), indicates that both male (50.5%) and female (49.5%) participants are

equally represented. The frequency chart for History of Anxiety (Table 3), indicates that only 16

participants (15.5%) reported having a history of anxiety.

Descriptive Statistics

		Exam Performance (%)	Exam Anxiety
N	Valid	103	103
	Missing	0	0
Mean		56.57	74.3437
Median		60.00	79.0440
Mode		70[a]	82.27[a]
Std. Deviation		25.941	17.18186
Minimum		2	.06
Maximum		100	97.58

a. Multiple modes exist. The smallest value is shown

Table 1: Descriptive Statistics of Exam Performance and Exam Anxiety

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	52	50.5	50.5	50.5
	Female	51	49.5	49.5	100.0
	Total	103	100.0	100.0	

Table 2: Frequencies for Gender

History of Anxiety

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	16	15.5	15.5	15.5
	No	87	84.5	84.5	100.0
	Total	103	100.0	100.0	

Table 3: Frequencies for History of Anxiety

Outliers

The distribution of Exam Performance (Table 4) appears to be normal however the distribution of Exam Anxiety (Table 5) is negatively skewed. Histograms of Exam Anxiety compared to both History of Anxiety (Table 6) and Gender (Table 7) indicated the presence of five minor and four major outliers. Eight of the outliers, case numbers 15, 24, 28, 33, 37, 53, 78, and 83, were eliminated from the study.
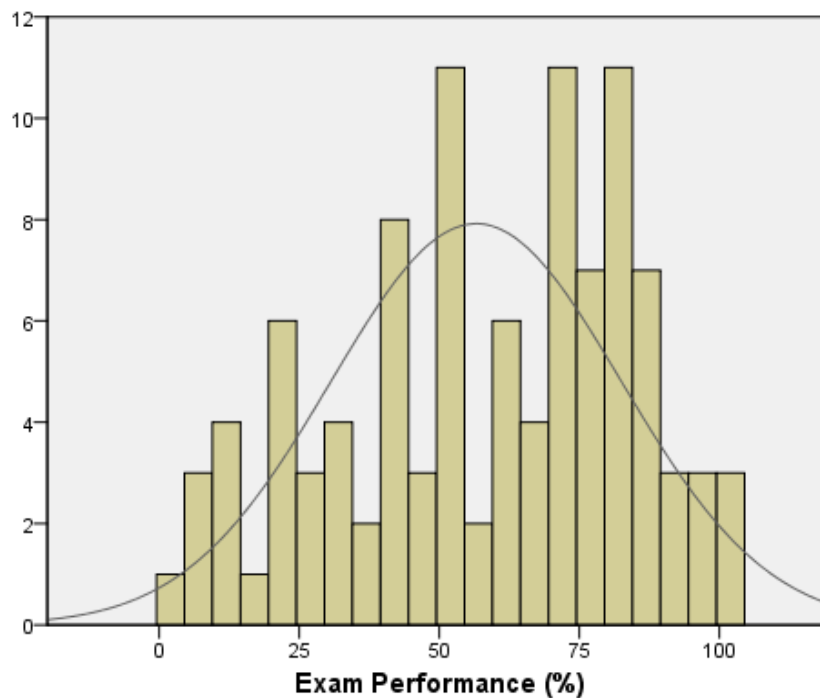

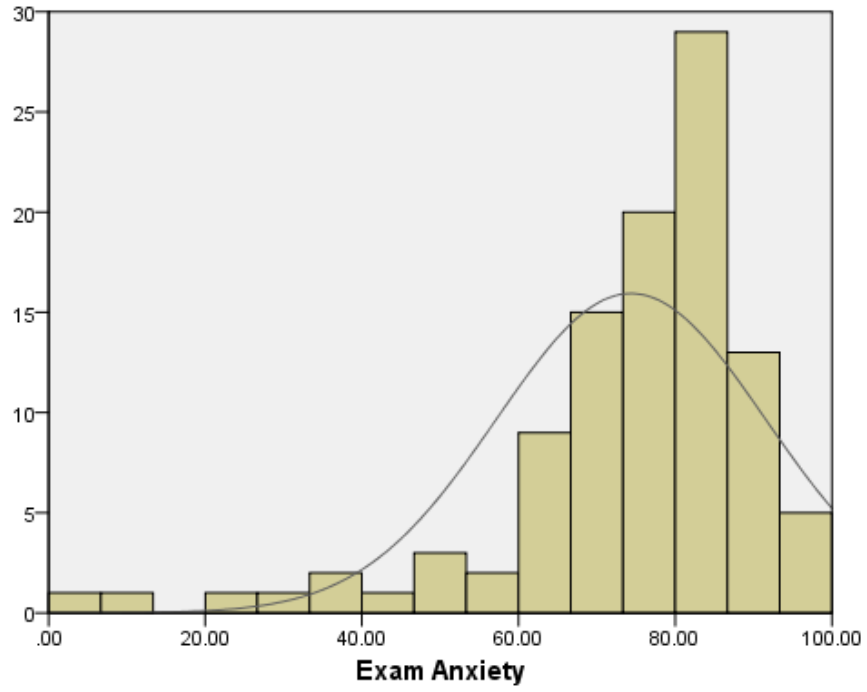Table 4: Histogram of Exam Performance
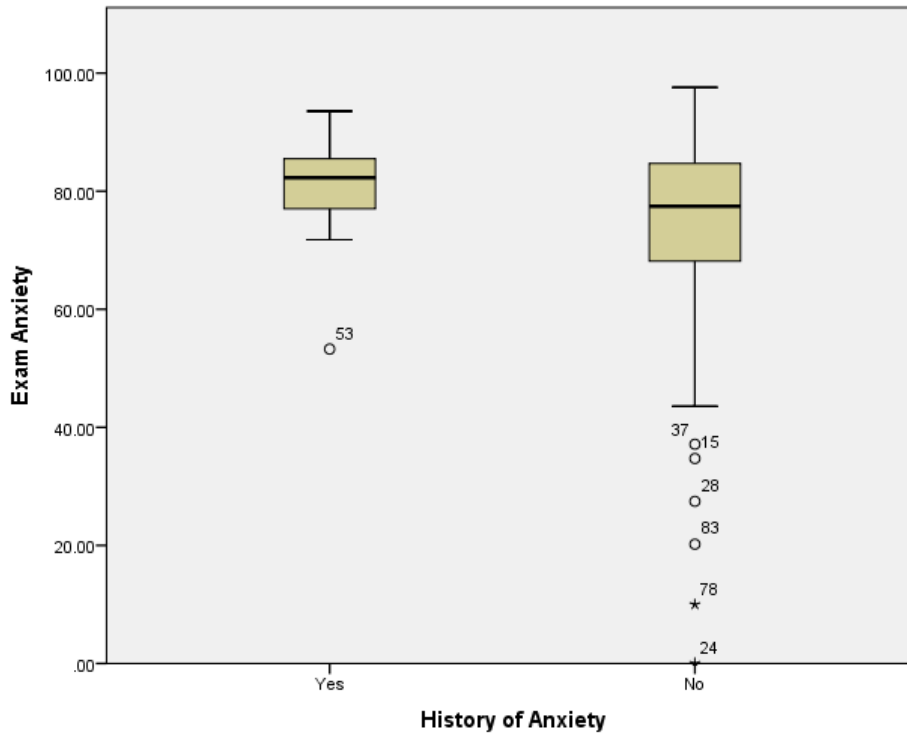
Table 5: Histogram of Exam Anxiety
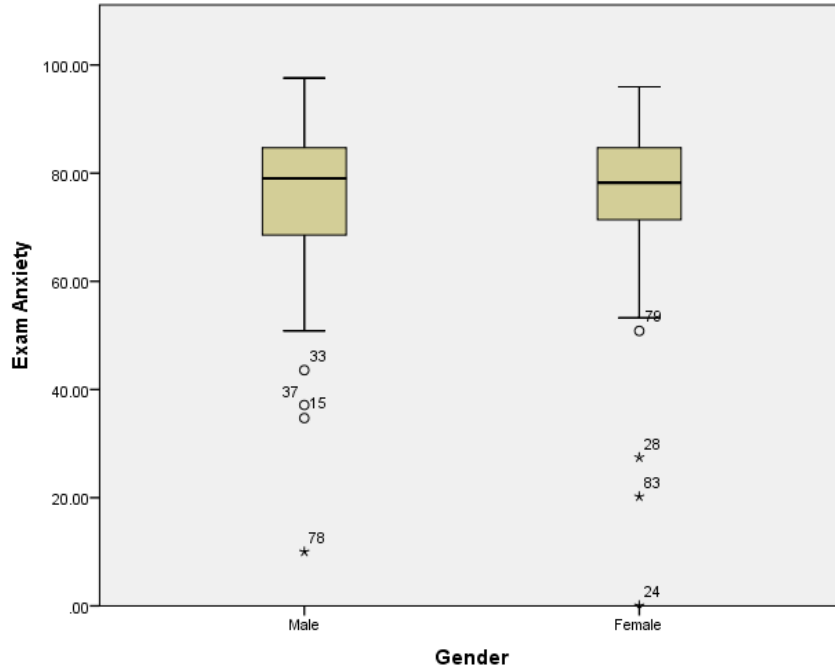

Table 6: Histogram of Exam Anxiety vs. History of Anxiety

Table 7: Histogram of Exam Anxiety vs. Gender

Re-examining the data with the outliers excluded, we found (Tables 8 and 9):

Statistics

		Exam Performance (%)	Exam Anxiety
N	Valid	95	95
	Missing	0	0
Mean		54.44	78.2210
Median		60.00	79.0440
Mode		70[a]	82.27[a]
Std. Deviation		25.398	10.07927
Minimum		2	50.83
Maximum		100	97.58
Percentiles	25	35.00	71.7900
	50	60.00	79.0440
	75	75.00	84.6860

a. Multiple modes exist. The smallest value is shown

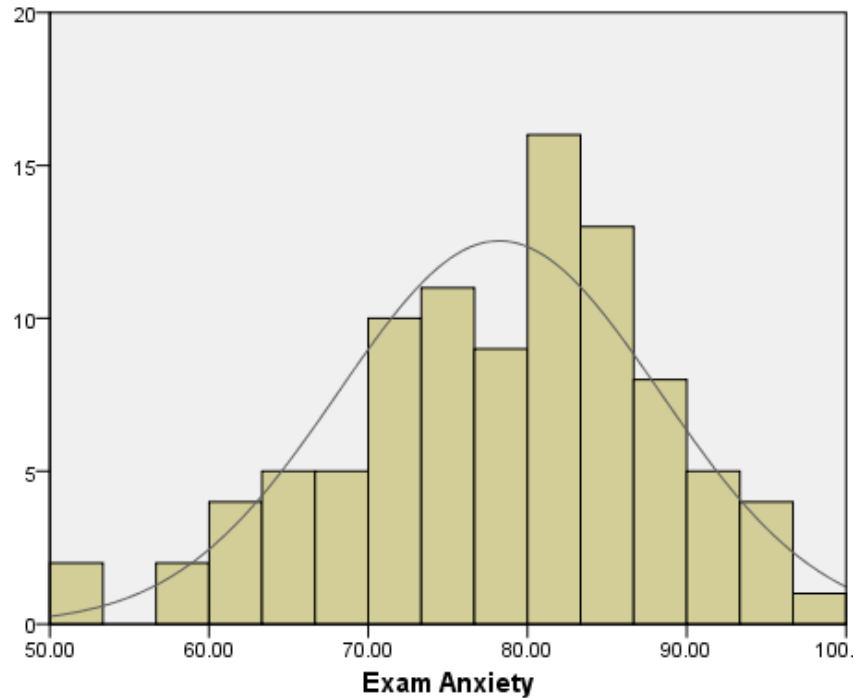Table 8: Descriptive statistics with outliers excluded

Table 9: Histogram of Exam Anxiety with outliers excluded

Correlations

A Pearson product-moment correlation coefficient was computed to assess the

relationship between Exam Performance and Exam Anxiety. A scatterplot summarizes the

results (Table 10). Exam Performance and Exam Anxiety have a negative linear correlation (R^2

Linear = 0.117). The linear regression is y= 1.22E2+-0.86*x. Exam Performance and Exam

Anxiety are negatively correlated (Table 11), Pearson's $r(95) = -.432$, $p < 0.001$. Overall, there

was a strong, negative correlation between Exam Performance and Exam Anxiety. Increases in

Exam Anxiety were correlated with decreases in Exam Performance.
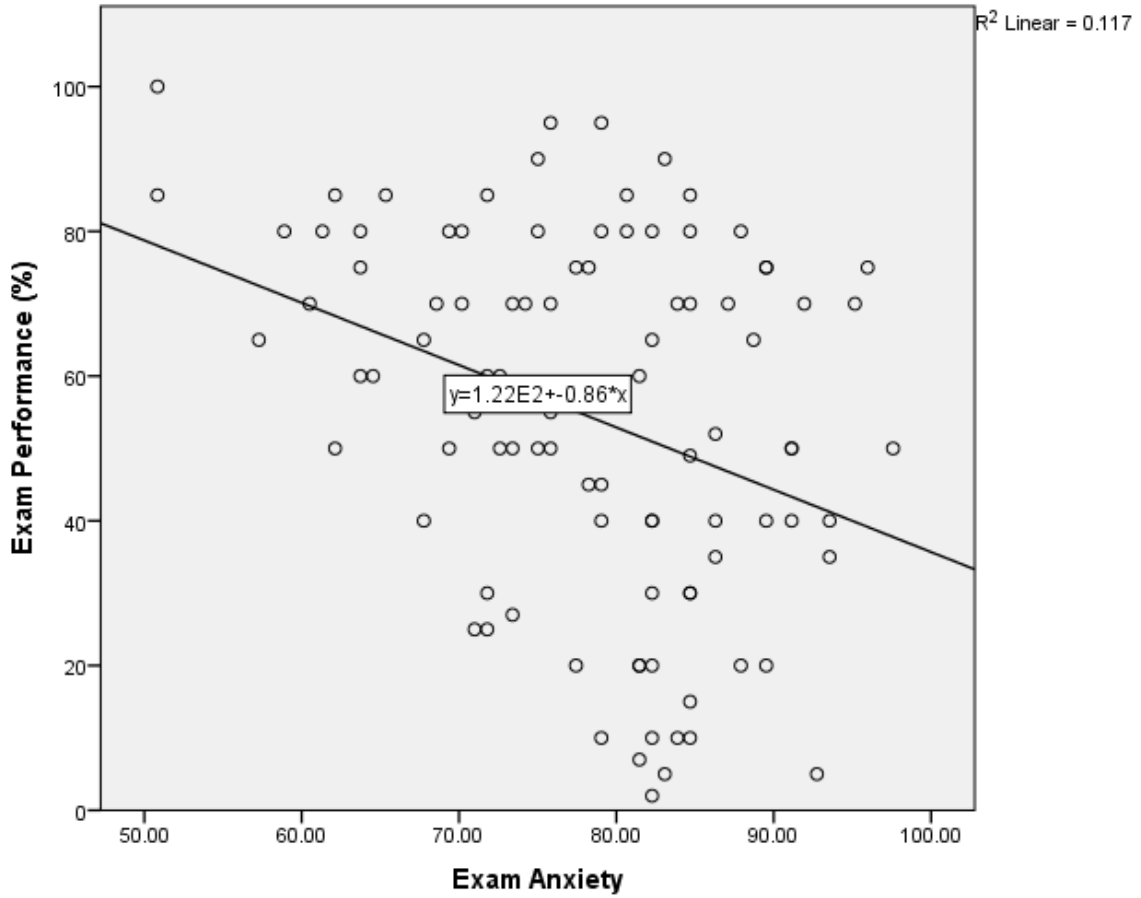
Table 10: Scatterplot of Exam Performance vs. Exam Anxiety

Correlations

		Exam Performance (%)	Exam Anxiety
Exam Performance (%)	Pearson Correlation	1	-.342[**]
	Sig. (2-tailed)		.001
	N	95	95
Exam Anxiety	Pearson Correlation	-.342[**]	1
	Sig. (2-tailed)	.001	
	N	95	95

**. Correlation is significant at the 0.01 level (2-tailed).

Table 11: Correlation of Exam Performance and Exam Anxiety

An independent-samples t-test was conducted to compare the levels of Anxiety between males and females (Tables 12 and 13).

H_o: There is no statistically significant difference in the means of Exam Anxiety between

males and females: $\mu_m = \mu_f$

H_a: There is a statistically significant difference in the means of Exam Anxiety between

males and females: $\mu_m \neq \mu_f$

There was no significant difference in the scores for males (M=77.97, SD=10.40) and females (M=78.48, SD=9.85) conditions; $t(93)$= -0.245, $p = 0.807$. These results suggest that there is no significant difference in the levels of Exam Anxiety between males and females.

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Exam Anxiety	Male	48	77.9693	10.39700	1.50068
	Female	47	78.4781	9.84984	1.43675

Table 12: Group Statistics for Exam Anxiety vs. Gender

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Exam Anxiety	Equal variances assumed	.267	.606	-.245	93	.807	-.50875	2.07876	-4.63675	3.61925
	Equal variances not assumed			-.245	92.900	.807	-.50875	2.07756	-4.63444	3.61694

Table 13: Independent Samples t-Test results

An independent-samples t-test was conducted to compare Exam Performance between males and females (Tables 14 and 15).

H_o: There is no statistically significant difference in the means of Exam Performance between males and females: $\mu_m = \mu_f$

H_a: There is a statistically significant difference in the means of Exam Performance between males and females: $\mu_m \neq \mu_f$

There was no significant difference in the scores for males (*M*=54.33, *SD*=25.64) and females *(M*=54.33, *SD*=25.42) conditions; *t*(93)= -0.042, *p* = 0.967. These results suggest that there is no statistically significant difference between males and females in Exam Performance.

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Exam Performance (%)	Male	48	54.33	25.642	3.701
	Female	47	54.55	25.424	3.708

Table 14: Group Statistics for Exam Performance vs. Gender

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means							
							Mean Differe	Std. Error Differe	95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	nce	nce	Lower	Upper
Exam Performance (%)	Equal variances assumed	.148	.701	-.042	93	.967	-.220	5.240	-10.625	10.185
	Equal variances not assumed			-.042	92.985	.967	-.220	5.239	-10.624	10.184

Table 15: Independent Samples t-Test results

An independent-samples t-test was conducted to compare Exam Performance between students with a history of anxiety and students without a history of anxiety (Tables 16 and 17).

Ho: There is no statistically significant difference in the means of Exam Performance between students with a History of Anxiety and students without a History of Anxiety: $\mu m = \mu f$

Ha: There is a statistically significant difference in the means of Exam Performance between students with a History of Anxiety and students without a History of Anxiety: $\mu m = \mu f$

There was a significant difference in the scores for students with a History of Anxiety ($M = 19.07$, $SD = 14.46$) and students without a History of Anxiety ($M = 61.53$, $SD = 20.90$) conditions; $t(93) = -0.245$, $p = 0.807$. These results suggest that students with a History of Anxiety perform significantly lower on exams than students without a History of Anxiety.

Group Statistics

	History of Anxiety	N	Mean	Std. Deviation	Std. Error Mean
Exam Performance (%)	Yes	15	19.07	14.464	3.735
	No	79	61.53	20.909	2.352

Table 16: Group Statistics for Exam Performance vs. History of Anxiety

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Exam Performance (%)	Equal variances assumed	3.661	.059	-7.515	92	.000	-42.465	5.650	-53.687	-31.243
	Equal variances not assumed			-9.621	26.563	.000	-42.465	4.414	-51.528	-33.402

Table 17: Independent Samples t-Test results

Conclusion

      Given the results of the Pearson Product Moment Correlation, the researcher rejected the null hypothesis and concluded that there was a statistically significant relationship between Exam Anxiety and Exam Performance. The results of the Independent Samples t-Tests concluded that there were no statistically significant differences between males and females on Exam Anxiety and Exam Performance scores. However, there was a statistically significant difference on Exam Performance for students with and without a History of Anxiety. Therefore, anxiety does have a negative effect on exam performance, but gender is not a significant factor.

References

Field, A. (2013). Discovering statistics using IBM SPSS statistics. Thousand Oaks, CA: Sage

Appendix A

Code Participant Code	History Participant has a history of anxiety. 1-Yes 2-No	Exam Exam Performance (%)	Anxiety Exam Anxiety	Gender 1-Male 2-Female
1	1	40	86.30	1
2	2	65	88.72	2
3	2	80	70.18	1
4	2	80	61.31	1
5	2	40	89.52	1
6	2	70	60.51	2
7	1	20	81.46	2
8	2	55	75.82	2
9	2	50	69.37	2
10	2	40	82.27	2
11	2	45	79.04	1
12	2	85	80.66	1
13	2	70	70.18	1
14	1	50	75.01	2
15	2	95	34.71	1
16	2	70	95.16	1
17	2	95	75.82	1

18	2	95	79.04	2
19	2	50	91.13	2
20	2	60	64.54	1
21	2	80	80.66	1
22	2	75	77.43	1
23	2	85	65.34	2
24	2	90	.06	2
25	1	30	71.79	2
26	2	60	81.46	2
27	2	75	63.73	1
28	2	75	27.46	2
29	1	27	73.40	2
30	1	20	89.52	1
31	2	75	89.52	2
32	2	90	75.01	2
33	2	60	43.58	1
34	2	30	82.27	1
35	2	80	79.04	1
36	1	10	79.04	2
37	2	85	37.13	1
38	1	7	81.46	1
39	1	5	83.07	2
40	2	85	50.83	1

41	2	20	82.27	1
42	2	45	78.24	2
43	2	60	72.60	1
44	2	70	74.21	2
45	2	50	75.82	2
46	2	25	70.98	1
47	2	50	97.58	1
48	2	40	67.76	1
49	2	80	75.01	1
50	2	50	73.40	2
51	1	35	93.55	2
52	2	80	58.89	2
53	1	50	53.25	2
54	2	49	84.69	1
55	2	75	89.52	2
56	2	25	71.79	2
57	2	65	82.27	1
58	2	80	69.37	1
59	2	50	62.12	1
60	2	70	68.57	2
61	2	40	93.55	1
62	2	80	84.69	2
63	1	10	82.27	1

64	2	20	81.46	2
65	2	40	82.27	1
66	2	40	91.13	1
67	2	70	91.94	2
68	2	52	86.30	2
69	2	50	72.60	1
70	2	60	63.73	2
71	2	80	63.73	1
72	2	60	71.79	2
73	2	65	57.28	1
74	1	15	84.69	2
75	2	85	84.69	1
76	2	20	77.43	2
77	2	80	82.27	2
78	2	100	10.00	1
79	2	100	50.83	2
80	2	80	87.91	1
81	1	10	83.88	1
82	2	70	84.69	2
83	2	100	20.21	2
84	2	70	87.10	1
85	2	70	83.88	2
86	2	65	67.76	1

87	2	75	95.97	2
88	2	85	62.12	2
89	2	30	84.69	1
90	1	5	92.75	1
91	2	10	84.69	2
92	2	90	83.07	2
93	2	70	73.40	1
94	2	20	87.91	2
95	2	85	71.79	1
96	2	35	86.30	1
97	2	30	84.69	2
98	2	70	75.82	1
99	2	55	70.98	2
100	2	75	78.24	2
101	1	2	82.27	1
102	2	40	79.04	1
103	2	50	91.13	2

Rows that are greyed out are the outliers that were eliminated from the results.