

Correlation and Regression Practice Problems

1. The data below concerns data collected by 12 employees at Dunder-Mifflin Paper. The manager is interested in whether job satisfaction scores may be related to job performance scores.

- Calculate a Pearson Correlation on the data.
- Test whether the two variables are significantly related (use $\alpha = .05$, two-tailed test).
- Report in APA format.
- Report and interpret the effect size.

satisfaction	performance
18	9
14	8
15	8
9	4
8	3
12	6
4	1
19	10
10	6
6	5
17	8
14	8

Answer:

- $r = .94$,
- $t_{crit} = \pm 2.228$, $t_{obs} = 8.49$. Correlation is statistically significant.
- $r(10) = .94$, $p < .05$.
- $r^2 = .88$. Therefore 88% of variability in performance can be explained by job satisfaction.

2. A student in Wilmington ranks 10 pizza restaurants based on taste (1 = best tasting) and also on cost (1 = most expensive).

- Calculate a Spearman Correlation on the data.
- Test significance – Is taste positively correlated with cost? Test at $\alpha = .05$
- Report in APA format.

taste rank	cost rank
1. Brixx Pizza	1
2. Brooklyn Pizza	5
3. Antonio's Pizza	6
4. Siena's pizza	2
5. Elizabeth's Pizza	3
6. Mellow Mushroom	4
7. Cici's Pizza	10
8. Papa John's Pizza	8
9. Michelangelo's Pizza	7
10. Domino's Pizza	9

Answers:

- a. $r_s = .73$.
- b. $t_{crit} = +1.86$; $t_{obs} = 3.0$, positive correlation is significant.
- c. A Spearman Correlation revealed that taste ranks is significantly and positively correlated with cost rank, $r_s(8) = .73$, $p < .05$.

3. The data below concerns the number of applications students sent out to graduate schools, and whether or not they were accepted into a graduate program.

- a. Conduct a Point-Biserial Correlation to determine if the number of applications is positively correlated with acceptance.
- b. Test whether this positive relationship is significant, using a 1-tailed test at $\alpha = .05$.
- c. Report your findings in APA format.

Below are the number of applications for those who were accepted and those who were not accepted into graduate programs.

accepted	not accepted
15	8
10	7
12	4
16	6
20	
15	

Answers:

- a. $r_{pb} = .85$.
- b. $t_{crit} = +1.86$, $t_{obs} = 4.55$. Applications are positively correlated with acceptance.
- c. A Point-Biserial Correlation revealed that the number of applications sent out are positively correlated with the likelihood of acceptance into a graduate program, $r_{pb}(8) = .85$, $p < .05$.

4. Conduct a simple regression analysis to determine if the GRE Analytical Writing Score is positively correlated with G.P.A.

- a. Calculate the standard error of estimate and interpret.
- b. What percentage of variation in GPA can be explained by GRE scores?
- c. Test the significance of r^2 and report in APA format.
- d. Test the significance of the regression coefficient and report in APA format. Interpret the regression coefficient.

GRE	GPA
3.0	3.26
4.0	3.35
3.5	2.98
4.0	3.41
4.5	3.65
5.0	3.86
3.5	3.1
4.5	3.45
2.5	2.1
3.0	2.85

Answers:

- a. $S_{y.x} = .23$. On average GPA observed differs from predicted GPA by .23.
- b. 79% of total variation in GPA can be explained by GRE scores. (i.e., $r^2 = .79$).
- c. $F_{crit} = 5.32$, $F_{obs} = 31.35$. GRE accounted for a significant proportion of variation in GPA, $r^2 = .79$, $F(1, 8) = 31.35$, $p < .05$.
- d. The regression coefficient differed significantly from zero, $b = .55$, $t(8) = 5.60$, $p < .05$. For every one-unit change in GRE writing score, GPA increases by .55.