

## Some Review Problems for the Final Exam: Correlation and Regression

1. A researcher wishes to determine whether there is a relationship between the number of job offers one receives and years of college education. A sample of 12 individuals was selected with the following results:

Years of College (X)	No. of Job Offers (Y)
1	0
1	1
2	2
2	3
3	5
3	4
4	7
4	8
5	9
5	8
6	7
6	6

$$SX = 42$$

$$SY = 60$$

$$SXY = 261$$

$$S(X\text{-squared}) = 182$$

$$S(Y\text{-squared}) = 398$$

- Calculate the regression equation and interpret the meaning of the regression coefficients (a and b).
- Compute the correlation coefficient, r.  
[Optional: test it for significance at the  $\alpha = .05$  level.]
- Compute the coefficient of determination (r-squared) and explain its meaning.
- Use the regression equation to predict the number of job offers an individual with 8 years of college could expect.

2. A researcher wishes to determine whether there is a relationship between IQ and salary. A sample of 10 individuals was selected with the following results:

<b>IQ</b>	<b>Salary (in Thousands)</b>
90	18
95	20
100	22
100	25
105	30
110	30
115	40
120	45
120	50
150	50

$$\Sigma \text{IQ} = 1105$$

$$\Sigma \text{Salary} = 330$$

$$\Sigma (\text{IQ})(\text{Salary}) = 38,170$$

$$\Sigma \text{IQ squared} = 124,775$$

$$\Sigma \text{Salary squared} = 12,258$$

- Find the regression coefficients and state the regression equation.
- Interpret the meaning of the Y-intercept and the slope in this problem.
- Use the regression model to predict the salary for an individual with an IQ of 140.
- Compute the correlation coefficient,  $r$ . [Optional: Test  $r$  for significance at the .05 level.] What does  $r$  tell you?
- Compute the coefficient of determination,  $r$ -squared. What does it tell you?

3. A researcher uses MS Excel to compare the happiness scores of married (variable1) with unmarried adults. The results are below:

### Two-Sample T-Test – Output Analysis

t-Test: Two-Sample Assuming Equal Variances

	<i>Variable 1</i>	<i>Variable 2</i>
Mean	73.23529412	43.53846154
Variance	303.4411765	451.1025641
Observations	17	13
Pooled Variance	366.7246283	
Hypothesized Mean Difference	0	
df	28	
t Stat	4.208967783	
P(T<=t) one-tail	0.000119692	
t Critical one-tail	1.701130259	
P(T<=t) two-tail	0.000239384	
t Critical two-tail	???????????	

- (a) Referring to the above printout, the calculated value of the t-statistic is:
- (b) The Critical two-tail value at the .05 significance level is:
- (c) Is there a significant difference between the two groups?

Answers

1. (a)  $Y = -.10 + 1.46X$  every year of college results in an additional 1.46 job offers. 0 years of college results in -.10 offers.  
(b)  $r = .87$  [Optional:  $t_{10} = 5.6$   $p < .05$  the correlation is significant]  
(c)  $r\text{-squared} = 75.7\%$ . 75.7 percent of the variation in the number of job offers received is explained by years of college.  
(d)  $-.10 + 1.46(8) = 11.58$  job offers
  
2. (a)  $\text{Salary} = -37.50 + .638(\text{IQ})$   
(c) Individuals with IQ's of 140 should earn, on average, \$51,820  
(d)  $r = .89$  [Optional: The r is significant ( $t_8 = 5.52$ ,  $p < .05$ )]  
(e)  $r^2 = 79.21\%$
  
3.  
(a) 4.208967783  
(b) 2.0484  
(c) The difference of approximately 30 points is statistically significant.