

Problem 1: Bankrate.com reports mortgage loan interest rates for 30-year and 15-year fixed-rate mortgage loans for 9 randomly selected Willamette Valley lending institutions. Assuming normality, a financial analyst would like to determine whether there is a difference between mean 30-year rates and mean 15-year rates.

	Lending Institution								
	1	2	3	4	5	6	7	8	9
30-Year	6.715	6.748	6.740	6.597	6.425	6.880	6.900	6.675	6.790
15-Year	6.599	6.367	6.550	6.362	6.162	6.583	6.800	6.394	6.540

a) State null hypothesis and alternative hypothesis. (4 points)

Ho:

Ha:

b) Calculate the value of the test statistics. Specify the test statistic (“z” or t”) clearly. (6 points)

c) Find the p -value using the appropriate table. Draw the curve and highlight the corresponding area. (4 points)

d) At the .05 significance level, do you reject or retain the null hypothesis? Circle the correct answer and explain using *the p-value found in part c*). (2 points)

Reject Ho / Retain Ho

Why?

e) Interpret the result, this includes the weight of evidence, the conclusion, and the significance level. (4 points)

Problem 2: A large discount chain compares the performance of its credit managers in Ohio and Illinois by comparing the mean dollar amounts owed by customers with delinquent charge accounts in these two states. 10 delinquent accounts were randomly selected from Ohio and 10 delinquent accounts were randomly selected from Illinois. Here we would like to test whether there is a difference between the population mean dollar amounts owed by customers with delinquent charge accounts in Ohio and Illinois.

Ohio: $n_1 = 10$ delinquent accounts, $\bar{x}_1 = \$524$ and $s_1 = \$68$

Illinois: $n_2 = 10$ delinquent accounts, $\bar{x}_2 = \$473$ and $s_2 = \$22$

Difference: $n_d = 10$ $\bar{d} = \$51$ and $s_d = \$37$

- a) State null hypothesis and alternative hypothesis. (4 points)

Ho:

Ha:

- b) Calculate the value of the test statistics. Specify the test statistic (“z” or t”) clearly. (6 points)

- c) Find the p -value using the appropriate table. Draw the curve and highlight the corresponding area. (4 points)

- d) At the .05 significance level, do you reject or retain the null hypothesis? Circle the correct answer and explain using the *p-value found in part c*. (2 points)

Reject Ho / Retain Ho

Why?

- e) Interpret the result, this includes the weight of evidence, the conclusion, and the significance level. (4 points)

Problem 3: In the book *Essentials of Marketing Research*, William R. Dillon, Thomas J. Madden, and Neil H. Firtle discuss a research proposal in which a telephone company wants to determine whether the appeal of a new security system varies between homeowners and renters. Independent samples of 140 homeowners and 60 renters are randomly selected. Each respondent views a TV pilot in which a test ad for the new security system is embedded twice. Afterward, each respondent is interviewed to find out whether he or she would purchase the security system. Results show that 25 out of the 140 homeowners definitely would buy the security system, while 9 out of the 60 renters definitely would buy the system.

- a) State null hypothesis and alternative hypothesis. (2 points)

Ho:

Ha:

- b) Find the sample proportion of homeowners who would buy the security system, the sample proportion of renters who would buy the security system, and the grand proportion. (6 points)

Sample Proportion of Homeowners:

Sample Proportion for Renter:

Grand Proportion:

- c) It is given that the test statistic is 0.4926; use this information to find the p -value using the appropriate table. Draw the curve and highlight the corresponding area (3 points)

- d) At the .05 significance level, do you reject or retain the null hypothesis? How about at the .01 significance level. Circle the correct answer and explain using *the p-value found in part c*). (4 points)

At $\alpha = .05$ Reject Ho / Retain Ho Why?

At $\alpha = .01$ Reject Ho / Retain Ho Why?

- e) Find a 95% confidence interval for the difference between the two proportions of homeowners and renters who would buy the security system. . Interpret the result. (5 points)

Problem 4: Suppose 85% of a certain product actually satisfy the requirement, and we have 25 of such products. Let X be the number of products satisfy the requirement.

- a) What is the name of this distribution? Circle the correct answer. (1 point)
- A) Discrete Distribution. B) Sampling Distribution about the Mean
C) Normal Distribution D) Binomial Distribution
- b) Find the probability that exactly 15 products satisfy the requirement (4 points)
- c) Find the population mean and standard deviation. (2 points)
- d) Now *assume* that the distribution is actually *normal*, and a sample of 36 of such products has selected. Find the probability that the mean number of products satisfy the requirement is at least 16. (3 points)

Problem 5: The chairman of the marketing department at a large state university undertakes a study to relate starting salary after graduation for marketing majors to grade point average (GPA) in major courses. To do this, records of 7 recent marketing graduates are randomly selected.

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	-----	1.234863	11.99778	7.1E-05
Slope	-----	0.395307	14.43578	2.88E-05

$$SS_{xx} = 1.8407 \quad SS_{yy} = 10.504 \quad \sum x_i = 21.57 \quad \sum y_i = 226.8$$

- a) Identify the dependent variable and the independent variable. (2 points)

Dependent Variable:

Independent Variable:

b) Find the regression equation, and interpret it. (5 points)

c) Find the 95% confidence interval of the slope.(4 points)

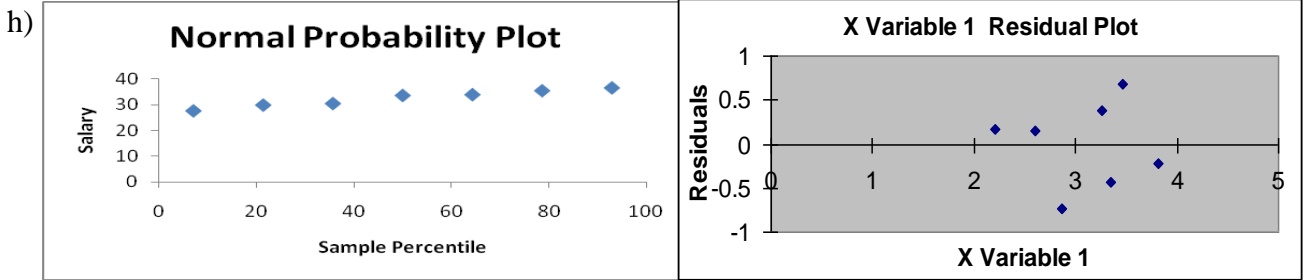
d) Complete the following ANOVA table. (7 points)

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>
Regression					1.97E-08
Residual		1.438			
Total		61.38			

e) Find the coefficient of determination and the coefficient of correlation. (2 points)

f) Find the predicted starting salary when the graduation GPA in majoring courses is 3.5. (2 points)

g) Find 95% predicted interval for part f). (4 points)



Do you think the data satisfy the assumption of *Variance Constancy*? (1 point) Yes No
 Do you think the data satisfy the assumption of *Normality*? (1 point) Yes No

i) *Sketch* the Regression Line (use normal line), the confidence interval (use dotted line), and the predicted interval (use dashed line). Name x -axis and y -axis variables clearly (**NOT** just write x and y). (2 points)