MAT156: Statistics
Chapter Review #3

Name: _____
Date: _____ Period: _____

1. Ten pairs of data yield the linear correlation coefficient r = -0.403 and the regression equation $\hat{y} = 3x + 2$. Also, $\bar{y} = 5.0$. What is the best predicted value for x = 2?

$H_0: \rho = 0$
$H_A: \rho \neq 0$
$\alpha = 0.05$

$|-0.403| < .632$

Fail to reject H_0
There is no linear correlation

$\bar{y} = 5$ is the best predicted value

2. What can you conclude at the 0.01 significance level if 62 pairs of data result in a linear correlation coefficient of r = -.268? Show justification for your conclusion.

$H_0: \rho = 0$
$H_A: \rho \neq 0$

$|-0.268| < .330$

Fail to reject H_0
There is no linear correlation

3. Seventy pairs of data yield the linear correlation coefficient r = -0.403 and the regression equation $\hat{y} = 3x + 2$. Also, $\bar{y} = 5.0$. What is the best predicted value for x =2?

$H_0: \rho = 0$
$H_A: \rho \neq 0$
$\alpha = 0.05$

$|-0.403| > .236$

Reject H_0
There is linear correlation

$\hat{y} = 3(2) + 2$
$\hat{y} = 8$

4. Determine whether there is a significant linear correlation between the two variables, find the linear regression equation, and predict the household size that recycles 0.5 pounds of plastic. Use a significance level of 0.05. (Give info for <u>both</u> critical value and p-value methods.)

Weight of Plastic (lb)	0.27	3.05	1.41	2.10	2.83	2.19	1.81	0.85
Household Size (people)	2	5	3	3	6	4	2	1

$H_0: \rho = 0$
$H_A: \rho \neq 0$
$\alpha = 0.05$

$r = 0.848$

$|0.848| > .707$

Reject H_0
There is linear correlation

$\hat{y} = 0.534 + 1.497x$
$\hat{y} = 0.534 + 1.497(0.5)$
$\hat{y} = 1.3$ people

5. The number π is an irrational number with the property that when we try to express it in decimal form, it requires an infinite number of decimal places and there is no pattern of repetition. In the decimal representation of π, the first 100 digits occur with the frequencies described in the table below. At the 0.05 significance level, test the claim that the digits are uniformly distributed. ~~(Use either method.)~~

Expected Value

Digit	0	1	2	3	4	5	6	7	8	9
Frequency	8 10	8 10	12 10	11 10	10 10	8 10	9 10	8 10	12 10	14 10

H_0: all Digits are equally likely $p = \frac{1}{10}$

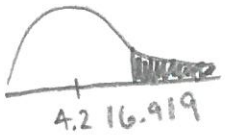
H_A: @ least one prob $\neq \frac{1}{10}$

$TS\ \chi^2 = \frac{(8-10)^2}{10} + \frac{(8-10)^2}{10} + \frac{(12-10)^2}{10} + \frac{(11-10)^2}{10} + \dots \frac{(14-10)^2}{10}$

$= \frac{4}{10} + \frac{4}{10} + \frac{4}{10} + \frac{1}{10} + \frac{0}{10} + \frac{4}{10} + \frac{1}{10} + \frac{4}{10} + \frac{4}{10} + \frac{16}{10}$

$= \frac{42}{10}$ or 4.2

$CV\ \chi^2 = 16.919$



Fail to reject H_0
Not enough evidence to reject Claim all digits are equally likely

6. A survey was conducted to determine whether there is a gender gap in the confidence people have in police. The sample results are listed in the accompanying table. Use a 0.01 significance level to test the claim that there is such a gap. (Critical Value Method)

Total = 500

	Confidence in Police		
	Great Deal	Some	Very Little or None
Men	115 116	56 60	29 24
Women	175 174	94 90	31 36

H_0: Confidence in police and gender are independent

H_A: Confidence in police and gender are dependent

$\alpha = 0.01$

$df = (3-1)(2-1) = 2$ $CV\ \chi^2 = 9.210$

$TS\ \chi^2 = \frac{(116-115)^2}{116} + \frac{(56-60)^2}{60} + \frac{(24-29)^2}{24} + \frac{(174-175)^2}{174} + \frac{(94-90)^2}{90} + \frac{(31-36)^2}{36}$

$\frac{1}{116} + \frac{16}{60} + \frac{25}{24} + \frac{1}{174} + \frac{16}{90} + \frac{25}{36} = 2.195$

Fail to reject H_0
There is not enough evidence to support the claim that confidence in police is dependent on gender

7. Many people believe that criminals who plead guilty tend to get lighter sentences than those who are convicted in trials. The accompanying table summarizes randomly selected sample data for San Francisco defendants in burglary cases. All of the subjects had prior prison sentences. At the 0.05 significance level, test the claim that the sentence is independent of the plea. If you were an attorney defending a guilty defendant, would these results suggest that you should encourage a guilty plea? ~~(P-value Method)~~

Total = 1028

	Guilty Plea	Not-Guilty Plea
Sent to Prison	392 418.48	58 31.52
Not sent to Prison	564 537.52	14 40.48

H_0: Sentance & Plea are independent

H_A: Sentance & Plea are dependent

$\alpha = 0.05$ $df = 1$ $CV\ \chi^2 = 3.841$

$TS\ \chi^2 = \frac{(392-418.48)^2}{418.48} + \frac{(58-31.52)^2}{31.52} + \frac{(564-537.52)^2}{537.52} + \frac{(14-40.48)^2}{40.48}$

$= 42.55$

Reject H_0
There is sufficient evidence to support the claim that Sentance and Plea are dependent