KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICS & STATISTICS
Term 172

STAT 212: BUSINESS STATISTICS II

Second Exam

Wednesday, 21 March 2018
5:00 PM - 7:00 PM

Name:_____

ID #:_____

Serial#:_____ **Section: 1 2 (Al-Sawi) 3 (Abbas)**

Important Notes:

1) **You must show all work to obtain full credit for questions on this exam.**
2) **DO NOT round your answers at each step. Round answers only if** necessary at your final step to **4 decimal places**.

Question No	Full Marks	Marks Obtained
Q1	14	
Q2	22	
Q3	30	
Q4	9	
Q5	9	
Total	**84**	

1. The director of advertising for the Arab News is studying the relationship between the type of community in which a reader lives and the section of the newspaper he/she reads first. For a sample of readers, he collected the sample information in the following table.

	National News	Sports News	Food News	Total
City	170	124	90	384
f_e	157.5	122.25	104.25	
$(f_o-f_e)^2 / f_e$	0.99206	?	1.94784	2.964956343
Suburb	120	112	100	332
f_e	136.17188	105.69531	90.13281	
$(f_o-f_e)^2 / f_e$	?	?	1.08020	
Rural	130	90	88	308
f_e	126.32813	98.05469	83.61719	
$(f_o-f_e)^2 / f_e$	0.10673	?	?	
Total	420	326	278	**1024**
$(f_o-f_e)^2 / f_e$		1.062775		?

I. (6 marks) Find the missing values in the table.

II. (8 marks) At the 0.1 significance level, can we conclude there is a relationship between the type of community where the reader lives and the section of the newspaper read first?

Hypotheses (2 marks): H_0:_____

Vs H_1: _____

Assumption(s) (1 mark):

Test Statistic (1 marks):

Decision Rule & Critical Value(s) (2 mark):

Decision (1 mark):

Managerial Conclusion (1 marks):

2. The claims department at Wise Insurance Company believes that younger drivers have more accidents and, therefore, should be charged higher insurance rates. Investigating a sample of 986 Wise policyholders revealed the following breakdown on whether a claim had been filed in the last 3 years and the age of the policyholder.

Age Group	Claim	No Claim
18 up to 30	74	170
f_e		
$(f_o-f_e)^2 / f_e$		
30 up to 50	58	**?**
f_e		
$(f_o-f_e)^2 / f_e$	0.43446	
50 or older	44	400
f_e		
$(f_o-f_e)^2 / f_e$		3.40733

(a) **(12 marks)** Is there evidence of a difference among the age groups with respect to filing claims? Use the .05 significance level.

Hypotheses (2 marks): H_0:_____

Vs H_1: _____

Assumption(s) (1 mark):

Test Statistic (4 marks):

Decision Rule (1 mark):

Critical Value(s) (1 mark):

Decision & Managerial Conclusion (1+2 marks):

(b) (10 marks) If appropriate, use the Marascuilo procedure and α=0.05 to determine which age groups are different.

3. TravelAir.com samples domestic airline flights to explore the relationship between airfare (in $) and distance (in miles). The service would like to know if there is a linear relationship between airfare and flight distance. The data follow.

Origin	Destination	Distance	Fare	Origin	Destination	Distance	Fare
Detroit, MI	Myrtle Beach, SC	636	109	Boston, MA	Covington, KY	752	252
Baltimore, MD	Sacramento, CA	2,395	252	Kansas City, MO	San Diego, CA	1333	206
Las Vegas, NV	Philadelphia, PA	2,176	221	Milwaukee, WI	Phoenix, AZ	1460	167
Sacramento, CA	Seattle, WA	605	151	Portland, OR	Washington, DC	2350	308
Atlanta, GA	Orlando, FL	403	138	Phoenix, AZ	San Jose, CA	621	152
Boston, MA	Miami, FL	1,258	209	Baltimore, MD	St. Louis, MO	737	175
Chicago, IL	Covington, KY	264	254	Houston, TX	Orlando, FL	853	191
Columbus, OH	Minneapolis, MN			Houston, TX	Seattle, WA		
Fort Lauderdale, FL	Los Angeles, CA			Burbank, CA	New York, NY		
Chicago, IL	Indianapolis, IN	177	128	Atlanta, GA	San Diego, CA	1891	291
Philadelphia, PA	San Francisco, CA	2,521	348	Minneapolis, MN	New York, NY	1028	260
Houston, TX	Raleigh/Durham, NC	1,050	224	Atlanta, GA	West Palm Beach, FL	545	123
Houston, TX	Midland/Odessa, TX	441	175	Kansas City, MO	Seattle, WA	1489	211
Cleveland, OH	Dallas/Ft.Worth, TX	1,021	256	Baltimore, MD	Portland, ME	452	139
Baltimore, MD	Columbus, OH	336	121	New Orleans, LA	Washington, DC	969	243

$\sum_{1}^{30}(Distance)$=35,091 , $\sum_{1}^{30}(Distance)^2 = 57{,}379{,}821$, $\sum_{1}^{30}(Distance * fare) = 8{,}182{,}312$

$\sum_{1}^{30}(fare) = 6{,}260$, $\sum_{1}^{30}(fare)^2 = 1{,}411{,}606$, $\sum_{1}^{30}(e_i)^2 = 60{,}073.59782$

(a) **(4 marks)** What is the average change in airfare (in $) per 1000 miles.

(b) **(2 marks)** Determine the regression equation for predicting the fare based on distance.

(c) **(2+8 marks)**

i. Compute the correlation coefficient and interpret its value.

Interpretation:

ii. At the 0.005 significance level, is it reasonable to conclude that the correlation coefficient is greater than zero?

Hypotheses (2 marks): H_0: Vs H_1:

Test Statistic (2 marks):

Decision Rule (1 mark):

Critical Value(s) (1 mark):

Decision & Managerial Conclusion (2 marks):

(d) **(2 marks)** What percentage of the variation in Fare is explained by Distance of a flight?

(e) A traveler is planning to fly from Baltimore to St. Louis. The distance is 737 miles.

3. **(2 marks)** Find the residual value.

4. **(3 marks)** Find a 99% confidence interval estimate for the fare of this traveler.

(f) **(5 marks)** Find a 95% C.I. for the slope and **interpret** its meaning in this problem.

Interpretation:

(g) **(2 marks)** Write down all the assumptions you made for the analyses in parts (a) – (f).

4. The personnel director of a large department store wants to reduce absenteeism among sales associates. She decides to institute an incentive plan that provides financial rewards for sales associates who are absent fewer than five days in a given calendar year. A sample of 100 sales associates selected at the end of the second year reveals the following:

	YEAR 2		
YEAR 1	**< 5 Days Absent**	**≥ 5 Days Absent**	**Total**
< 5 Days Absent	**32**	**4**	36
≥ 5 Days Absent	**25**	**39**	64
Total	57	43	100

At the 0.05 level of significance, is there evidence that the proportion of employees absent fewer than five days was lower in year 1 than in year 2?

Hypotheses (2 marks): H_0: Vs H_1:

Assumption(s) (1 mark):

Test Statistic (2 marks):

Decision Rule (1 mark):

Critical Value(s) (1 mark):

Decision (1 mark):

Managerial Conclusion (1 marks):

5. The marketing manager of a branch office of a lo- cal telephone operating company wants to study characteristics of residential customers served by her office. In particular, she wants to estimate the mean monthly cost of calls within the local calling region. In order to determine the sample size necessary, she needs an estimate of the standard deviation. On the basis of her past experience and judgment, she estimates that the standard deviation is equal to \$12. Suppose that a small-scale study of 15 residential customers indicates a sample standard deviation of \$9.25. At the 0.10 level of significance, is there evidence that the population standard deviation is different from \$14?

Hypotheses (1 marks):

H_0: Vs H_1:

Assumption(s) (1 mark):

Test Statistic (2 marks):

Decision Rule (1 mark):

Critical Value(s) (2 mark):

Decision (1 mark):

Managerial Conclusion (1 marks):