Math 2311

Homework 12 (Sections 8.3 – 8.6)

Name:_____ PeopleSoft ID:_____

Instructions:

- Homework will NOT be accepted through email or in person. Homework must be submitted through CourseWare BEFORE the deadline.
- Print out this file use or software and complete the problems.
- Write in black ink or dark pencil or type your solutions in the space provided. You must show all work for full credit.
- Submit this assignment at http://www.casa.uh.edu under "Assignments" and choose **hw12**.
- Total possible points: **15.**

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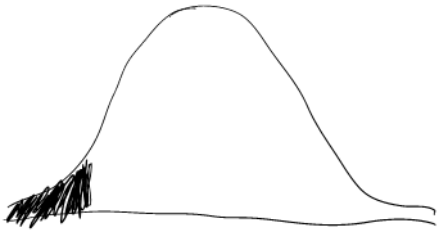
1. Section 8.3, Problem 2

Group 1: Nitrite:
xbar1 = 7880
s1 = 1115
n1 = 30

Group 2: Control:
xbar2 = 8112
s2 = 1250
n2 = 30

Ho: mu1 = mu2
Ha: mu1 < mu2

alpha: 0.02
df = 29



Rejection Region: t < -2.15
Test Statistic: t = -0.75
Not in Rejection Region (FRHo)
P-Value Test:
p = 23%
p > alpha (FRHo)

The groups have means which are essentially equal.

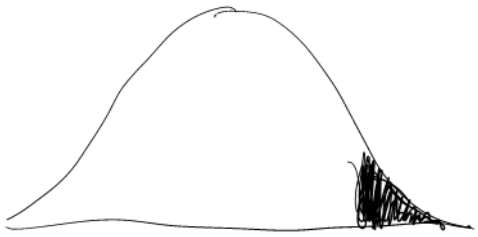
2. Section 8.3, Problem 4

Group 1: Method 1:
xbar1 = 85
s1 = 3
n1 = 75

Group 2: Method 2:
xbar2 = 83
s2 = 2
n2 = 60

Ho: mu1 = mu2
Ha: mu1 > mu2

df = 59
alpha: 0.01



```
> qt(1-0.01,59)
[1] 2.391229
> (85-83)/sqrt(3^2/75+2^2/60)
[1] 4.6291
> 1-pt(4.6291,59)
[1] 1.031719e-05
```

Rejection Region: t > 2.39
Test Statistic: t = 4.63
Within Rejection Region (RHo)
P-Value Test:
p = 0% (approx)
p < alpha (RHo)

Method 1 has better results than method 2.

3. Section 8.4, Problem 2

Group 1: Private University:
x1 = 753
n1 = 1327

Group 2: Public University:
x2 = 791
n2 = 1327

Ho: p1 = p2
Ha: p1 ≠ p2

alpha = 0.01

```
> phat1=653/1046
> phat2=791/1327
> phat1*1046
[1] 653
> (1-phat1)*1046
[1] 393
> phat2*1327
[1] 791
> (1-phat2)*1327
[1] 536
```

Assumptions are met.

```
> qnorm(0.01/2)
[1] -2.575829
> (phat1-phat2)/sqrt(phat1*(1-phat1)/1046+phat2*(1-phat2)/1327)
[1] 1.400179
> 2*pnorm(-1.400179)
[1] 0.1614597
```

Rejection Region: z < -2.58 or z > 2.58
Test Statistic: z = 1.40
Not in Rejection Region (FRHo)
P-Value Test:
p = 16%
p > alpha (FRHo)

There is no statistically significant difference in proportions between these groups.

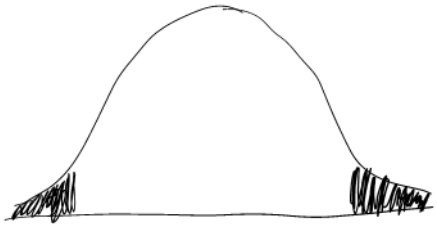
4. Section 8.4, Problem 4

Group 1: Urban
x1 = 36
n1 = 60

Group 2: Suburban
x2 = 31
n2 = 50

Ho: p1 = p2
Ha: p1 ≠ p2

alpha = 0.05



```
> phat1=36/60
> phat2=31/50
> phat1*60
[1] 36
> (1-phat1)*60
[1] 24
> phat2*50
[1] 31
> (1-phat2)*50
[1] 19
```

Assumptions are met

```
> qnorm(0.05/2)
[1] -1.959964
> (phat1-phat2)/sqrt(phat1*(1-phat1)/60+phat2*(1-phat2)/50)
[1] -0.2142748
> 2*pnorm(-0.2142748)
[1] 0.8303328
```

Rejection Region: z < -1.96 or z > 1.96
Test Statistic: z = -0.21
Not in Rejection Region (FRHo)
P-Value Test:
p = 83%
p > alpha (FRHo)

There is no statistically significant difference between these groups.

5. Section 8.5, Problem 2

Ho: expected is the same as observed
Ha: expected is different than observed

```
> assign("expperc",c(.20,.32,.10,.15,.23))
> assign("obs",c(65,100,29,48,75))
> sum(obs)
[1] 317
> exp=expperc*317
> sum((exp-obs)^2/exp)
[1] 0.3549582
> 1-pchisq(0.3549582,4)
[1] 0.9859957
```

p = 99%
alpha = 5%

p > alpha (FRHo)

The expected is the same as the observed.

6. Section 8.5, Problem 4

Ho: expected is the same as observed
Ha: expected is different than observed

```
> assign("expperc",c(.20,.30,.15,.25,.10))
> assign("obs",c(186,327,168,225,114))
> exp=expperc*1020
> sum((exp-obs)^2/exp)
[1] 9.441176
> 1-pchisq(9.441176,4)
[1] 0.05097008
```

p = 5.1%
alpha = 5%

p > alpha, (FRHo)
The manufacturer's claim is true

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7. Section 8.6, Problem 2

Observed	Employed Full Time	Not Full Time
HS Diploma	52	40
No HS Diploma	30	35

Total HS Diploma: 52+40=92

Total No HS Diploma: 30+35=65

Total Employed: 52+30=82

Total Not Employed: 40+35=75

Table total: n=157

Expected	Employed Full Time	Not Full Time
HS Diploma	(92*82)/157 = 48.051	(92*75)/157 = 43.949
No HS Diploma	(65*82)/157 = 33.949	(65*75)/157 = 35.051

(O-E)^2/E	Employed Full Time	Not Full Time
HS Diploma	(52-48.051)^2/ 48.051 = 0.325	(40-43.949)^2/ 43.949 = 0.355
No HS Diploma	(30-33.949)^2 /33.949 = 0.459	(35-35.051)^2 /35.051 = 0.00007

df = (rows - 1)*(columns - 1) = (2-1)(2-1) =1

```
> 0.325+0.355+0.459+0.00007
[1] 1.13907
> 1-pchisq(1.13907,1)
[1] 0.2858489
```

p-value = 29%
alpha = 5%

p > alpha (FRHo)
There is no association between earning a HS diploma and getting a full-time job.

8. Previous studies on sleep tendencies report that, on average, an adult American will sleep for 6 hours each night with a standard deviation of 0.75 hours. You survey a SRS of 100 adult Americans and determine that the mean sleep time is 5 hours. Which Hypothesis Test should be used here?

a. One-sample t-test for means
b. One-sample z-test for means
c. One sample z-test for proportions
d. One sample t-test for proportions
e. Chi-squared goodness of fit test

9. Previous studies on sleep tendencies report that 65% of adult Americans do not get the recommended amount of nightly sleep. You survey a SRS of 100 adult Americans and determine that 78% do not get the recommended amount of nightly sleep. Which Hypothesis Test should be used here?

a. One-sample t-test for means
b. One-sample z-test for means
c. One sample z-test for proportions
d. One sample t-test for proportions
e. Chi-squared goodness of fit test

10. A previous study on sleep tendencies report that 15% of adult Americans are significantly sleep deprived, 35% are sleep deprived, 25% sleep an appropriate amount, 15% oversleep a slight amount, and 10% significantly oversleep. To confirm these results, you survey a SRS of 100 adult Americans to and find that 28 are significantly sleep deprived, 42 are sleep deprived, 21 get an appropriate amount of sleep, 7 oversleep, and 2 sleep excessively too much. Which Hypothesis Test should be used here?

a. One-sample t-test for means
b. One-sample z-test for means
c. One sample z-test for proportions
d. One sample t-test for proportions
e. Chi-squared goodness of fit test