EPPS 2302 : Exam #2

To get full credit for your answer, you must show your work. Use the space provided on this sheet to show your work.

General Knowledge(40pt)

Problem 1(10pt)

Correctly label the following boxes as Type I errors or Type II errors

	Reject H0	Fail to Reject H0
H0:True	Type I	
H0:False		Type II

Problem 2(10pt)

1 There is no negative value in the F-values. Explain why ?
F values are ratios of variances

2 In a test, you decide to use $\alpha = 0.01$, and your Stata outcome shows your p value is 0.02.
What is your decision in the test ?

Fail to Reject H0

Problem 3(10pt)

Correctly write out H0 for an ANOVA test with five groups

$H0 = \mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5$

Problem 4(10pt)

1 Your regression model is $y_i = \beta_0 + \beta_1 x_i + \epsilon_i$
What is the H0 for F-test for this model ?

$\beta_1 = 0$

Problem 4(10pt) continued on next page...

2 When we calculate S_e for the regression model above, we use $\sqrt{\frac{\sum residual^2}{n-2}}$. In this formula, what does '2' in the denominator mean?

# of coefficients or variables

Computation(60pt)

Problem 5(10pt)

1 Find the test score for a sample with n=10, $\bar{x} = 7.9$, s=1.3, when H1 : $\mu > 8.8$

$t = \frac{7.9-8.8}{\frac{1.3}{\sqrt{10}}} = -2.189$

2 A survey claims that 9 out of 10 doctors recommend brand Z for their patients who have children. To test this claim against the alternative that the actual proportion of doctors who recommend brand Z is less than 90%, a random sample of 100 doctors results in 83 who indicate that they recommend brand Z. Find the test score.

$z = \frac{0.83-0.9}{\sqrt{\frac{0.9\times 0.1}{100}}} = -2.33$

Problem 6(10pt)

Correctly interpret main effects and interaction effect

```
anova earnings female##ethnic
```

```
                      Number of obs =    2714     R-squared     =  0.0735
                      Root MSE      = 14.7753     Adj R-squared =  0.0718

             Source |  Partial SS    df       MS           F     Prob > F
--------------------+-----------------------------------------------------
              Model |  46890.5176     5  9378.10351      42.96     0.0000
                    |
             female |  2868.70506     1  2868.70506      13.14     0.0003
             ethnic |  10491.8053     2  5245.90265      24.03     0.0000
      female#ethnic |  4296.94208     2  2148.47104       9.84     0.0001
                    |
           Residual |  591182.324  2708  218.309573
--------------------+-----------------------------------------------------
              Total |  638072.841  2713  235.190874
```

The main effect of female on earnings is significant,F(1,2708)=13.14, p=0.0003
The main effect of ethnic on earnings is significant,F(2,2708)=24.03, p<0.0001
The interaction effect between female and ethnic is significant, F(2,2708)=9.84, p=0.0001. Therefore we need to determine whether the effect qualifies the main effects or not.

Problem 7(10pt)

Find S_e for the data below, given that $\hat{y} = -2.5x$

x	-1	-2	-3	-4
y	2	6	7	10

$\sqrt{\frac{1.5}{2}} = 0.866$

Problem 8(10pt)

We have a survey data with two variables. One is a variable about whether patients have pets. The other one is a variable about whether the patients have heart disease. The data are listed below.
Test if the two variables are associated.
Show (1)your test score, (2)critical value, and (3)decision

	Pet Owner	Non-owner
Healthy heart	90	65
Heart problem	10	35

$\chi^2 = 17.92$, $\chi_c^2 rit = 3.841$, Reject H0

Problem 9(10pt)

The Political Economy program asked its professors and students to rank 5 quest speakers according to their communication skills. The data are listed below. Test the hypothesis of no correlation between the rankings.
Show (1)your test score, (2)critical value, and (3)decision

Speaker	A	B	C	D	E
Professors	1	2	3	4	5
Students	3	2	4	1	5

$r_s = 0.3$, and $r_{s-crit} = 1$, Fail to Reject H0.

Problem 10(10pt)

1 Fill the two blanks

F : $\frac{MS}{MS} = \frac{9236.8}{228.55}$=40.41, R^2 :0.0290

2 Correctly interpret the coefficient for exp(continuous variable) in the regression outcome.

For every 1 unit increase in exp, earnings will increase by 0.13, holding other factors fixed. But, the coefficient is not significant(t=1.82, p=0.069)

```
reg earnings exp tenure

      Source |       SS       df       MS              Number of obs =    2714
-------------+------------------------------           F(  2,  2711) =  (?    )
       Model |   18473.609     2   9236.8045           Prob > F      =  0.0000
    Residual |  619599.232  2711  228.550067           R-squared     =  (?     )
-------------+------------------------------           Adj R-squared =  0.0282
       Total |  638072.841  2713  235.190874           Root MSE      =  15.118

------------------------------------------------------------------------------
    earnings |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         exp |    .129738   .0714372     1.82   0.069    -.0103389    .2698148
      tenure |   .3661674   .0487205     7.52   0.000     .2706343    .4617004
       _cons |   14.74662    1.16809    12.62   0.000     12.45618    17.03706
------------------------------------------------------------------------------
```