STA 6166 – Exam 3 – Fall 2016 **PRINT** Name _____

Conduct all Tests at $\alpha = 0.05$ significance level.

Q.1. An experiment is conducted to compare 6 styles of keyboards in terms of comfort ratings for people who are professional computer programmers. A random sample of 5 programmers is obtained, and each programmer uses each keyboard in random order and assigns each keyboard a comfort rating. Give the sources of variation, their degrees of freedom and the critical F-value to test for differences among the population mean comfort ratings of the keyboard styles.

Source	Degrees of Freedom	F(0.05)

Q.2. A pharmaceutical firm is interested in the proportion (π) of all potential users of a new drug being marketed that will suffer from a particular adverse event. Based on a study with a sample of 800 subjects, 120 suffered from this adverse event. Compute a 95% Confidence Interval for the population proportion of all potential users who would suffer from this event.

Q.3. Among samples of size 10 from the NHL, NBA, and EPL athletes, the rank sums of their BMIs are:
$T_{NHL} = 215$ $T_{NBA} = 148.5$ $T_{EPL} = 101.5$. Conduct the Kruskal-Wallis test to test H_0: $M_{NHL} = M_{NBA} = M_{EPL}$

Test Statistic _____ Rejection H_0 if the Test Statistic _____

Q.4. An experiment compared 4 navigational techniques (CPB, DPB, ENCC, and G&C) for utilizing web-based maps. The experiment had 18 subjects, where each subject used each of the navigational techniques, and was conducted as a Randomized Complete Block Design. The response measured was the time it took for the subject to complete the task.

p.4.a. Complete the following ANOVA table for testing whether there are significant differences among the true mean completion times among the navigational techniques. H_0: $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = 0$

Source	df	SS	MS	F	F(.05)	Reject H0?
Trts (NavTechs)		23362				
Blocks (Subjects)		18500		#N/A	#N/A	#N/A
Error				#N/A	#N/A	#N/A
Total		90567	#N/A	#N/A	#N/A	#N/A

p.4.b. The means for the 4 treatments are $\bar{y}_{1.} = 177.9$ $\bar{y}_{2.} = 165.0$ $\bar{y}_{3.} = 133.3$ $\bar{y}_{4.} = 140.8$
Use Tukey's method to determine which pairs of treatments have significantly different means.

Tukey's W: _____ Trt3 Trt4 Trt2 Trt1

p.4.c. Compute the Relative Efficiency of the Randomized Block Design (relative to the Completely Randomized Design). How many subjects would be needed per treatment (and overall) to have the same precision of estimates of the Navigation Technique means?

Relative Efficiency _____ # Subjects per treatment _____ Total # of Subjects _____

Q.5. An experiment was conducted, comparing 3 menu labeling conditions in a restaurant (No Calorie Label, Calorie Label Only, and Calorie Label Plus Information). There were $n_i = 30$ people within each condition in a Completely Randomized Design. The sample means and standard deviations for the 3 conditions in terms of Y = Total Post-dinner Calories are given below.

$\bar{y}_{1.} = 180 \quad \bar{y}_{2.} = 290 \quad \bar{y}_{3.} = 180 \qquad s_1 = 310, \quad s_2 = 390 \quad s_3 = 310$

p.5.a. Compute the Between Treatment sum of squares, its degrees of freedom, and Mean Square.

SSB = _____ df_B = _____ MSB = _____

p.5.b. Compute the Within Treatment sum of squares, its degrees of freedom and Mean Square.

SSW = _____ df_W = _____ MSW = _____

Test H_0: $\mu_1 = \mu_2 = \mu_3$ versus H_A: Not all μ_i are equal

Test Statistic _____ Rejection Region _____ P-value > 0.05 or < 0.05

Q.6. A study measured distance covered among a sample of 5 University level soccer players (blocks) on 3 soccer field sizes (treatments) in simulated games. The field sizes were: 30x20m, 40x30m, and 50x40m. The data are given below. Use Friedman's test to determine whether population medians differ among the 3 field sizes.

Player	Size1	Size2	Size3
1	1288	1748	1696
2	1705	2105	2167
3	1141	1558	1493
4	1340	1755	1748
5	1573	1963	2036

Test Statistic: _____ Rejection Region: _____

Q.7. A manufacturing company is considering buying components from one of two potential firms. They are interested in comparing the true defective proportions of components for the 2 firms (π_1 and π_2). They obtain random samples of $n_1 = n_2 = 500$ components from each firm. The numbers of components not meeting specification are $y_1 = 100$ for firm 1 and $y_2 = 80$ for firm 2. Test whether there is evidence to conclude that either firm has a higher/lower true defective proportion than the other firm? H_0: $\pi_1 - \pi_2 = 0$ H_A: $\pi_1 - \pi_2 \neq 0$