Preparation for Midterm Exam #2

1. A random sample of 120 students from a large university yields mean GPA 2.71 with sample standard deviation 0.51. Construct a 90% confidence interval for the mean GPA of all students at the university.

2. A random sample of 81 workers at a company showed that they work an average of 100 hours per month with a standard deviation of 27 hours. At 95% confidence, how many more workers need to be included in the sample to provide a confidence interval with length 4 (i.e., the margin of error being 2)?

3. Make the following tests of hypotheses.

a) H_0: $\mu = 25$; H_a: $\mu \neq 25$ n = 81; $\bar{x} = 28$; $\sigma = 3$; $\alpha = 0.01$;

b) H_0: $\mu = 12$; H_a: $\mu < 12$ n =45; $\bar{x} = 11$; $\sigma = 4.5$; $\alpha = 0.05$;

c) H_0: $\mu = 40$; H_a: $\mu > 40$ n = 100; $\bar{x} = 46$; $\sigma = 7$; $\alpha = 0.1$.

4. A survey showed that people with a bachelor's degree earned average of 2116 a year in 2001. A sample of 900 persons with a bachelor's degree taken recently by a researcher showed that the persons in this sample earned in average of $2345 a year with a standard deviation of $210. Test at 5% significance level whether people with a bachelor's degree currently earn an average of $2116 against the alternative that it is more than $2116 in a year.

5. Make the following tests of hypotheses.

a) H_0: $\mu = 60$; H_a: $\mu \neq 60$ n = 14; $\bar{x} = 56$; S= 9; $\alpha = 0.05$;

b) H_0: $\mu = 35$; H_a: $\mu < 35$ n =24; $\bar{x} = 29$; S= 5.4 $\alpha = 0.005$;

c) H_0: $\mu = 47$; H_a: $\mu > 47$ n = 18; $\bar{x} = 51$; S=6; $\alpha = 0.001$.

6. A business school claims that students who complete a three month course of typing course can type on average, at least 1200 words an hour. A random sample of 25 students who completed this course typed on average, 1130 words an hour with a standard deviation of 85 words. Using the5 % significance level, can you conclude that the claim of the business school is true?

7. The following information is obtained from two independent samples from two populations

$n_1 = 155$; $\bar{x} = 5.58$; $\sigma_x = 1.62$

$n_2 = 190$; $\bar{y} = 4.80$; $\sigma_y = 1.52$

Test the 1% significance level if the two population means are the same against the alternative that they are different.

8. Daily wage is $13.62 for transportation workers and $11.61 for factory workers. Assume that these two estimates are based on random samples of 1000 and 1200 workers taken, respectively, from the two populations. Also assume that the standard deviations of the two populations are $1.85 and $1.4, respectively. Test at the 5% significance level if the mean daily wage of transportation workers and factory workers are the same against the alternative that it is higher for transportation workers.

9. The following information was obtained from two independent samples selected from two populations:

n_x=20 $\bar{x} = 33.75$ s_x = 5.25

n_y=22 $\bar{y} = 28.50$ s_y =4.55

Test at 1% significance level if the two population means are different.

10. A professor took two samples, one of 16 males and another of 15 females from university students who were enrolled in business statistics at the same university. He found that the mean score of male students in a mid-term was 75.3 with a standard deviation of 6.4, and the mean score of female students was 78.3 with a standard deviation of 7.3. Assume that the score of all male and all female students are normally distributed but unknown standard deviations. Test at the 5% significance level if the mean score in business statistics for all male and female students are the same against the alternative that male students have lower score than that for all female students.

11. Make the following tests of hypotheses.

a) H_0: $p_0 = 0.7$; H_a: $p_0 \neq 0.7$ n = 500; x= 340; α =0.01;

b) H_0: $p_0 = 0.3$; H_a: $p_0 > 0.3$ n = 230; x= 75; α =0.1;