ECO240 Practice Questions for Chapter 10, sections 10.1 and 10.2 (Midterm Exam 2 coverage)

10.1 You have been asked to determine if two different production processes have different mean numbers of units produced per hour. Process 1 has a mean defined as μ_1 and process 2 has a mean defined as μ_2. The null and alternative hypotheses are as follows:

$$H0: \mu_1 - \mu_2 = 0$$

$$H1: \mu_1 - \mu_2 > 0$$

Using a random sample of 25 pared observations, the sample means are 50 and 60 for populations 1 and 2. Can you reject the null hypothesis using a probability of Type I error = 0.05 if

a. the sample standard deviation of the difference is 20?

b. the sample standard deviation of the difference is 15?

10.2 You have been asked to determine if two different production processes have different mean numbers of units produced per hour. Process 1 has a mean defined as μ_1 and process 2 has a mean defined as μ_2. The null and alternative hypotheses are as follows:

$$H0: \mu_1 - \mu_2 \geq 0$$

$$H1: \mu_1 - \mu_2 < 0$$

Using a random sample of 25 pared observations, the sample means are 56 and 50 for populations 1 and 2. Can you reject the null hypothesis using a probability of Type I error = 0.05 if

a. the sample standard deviation of the difference is 30?

b. the sample standard deviation of the difference is 40?

10.3. In a study comparing banks in Germany and Great Britain, a sample of 145 matched pairs of banks was formed. Each pair contained one bank from Germany and one from Great Britain. The pairings were made in such a way that the two members were as similar as possible in regard to such factors as size and age. the ratio of total loans outstanding to total assets was calculated for each of the banks. For this ratio, the sample mean difference (German - Great Britain) was 0.0518, and the sample standard deviation of the differences was 0.3055. Test against a two-sided alternative the null hypothesis that the two population means are equal.

10.7 You have been asked to determine if two different production processes have different mean numbers of units produced per hour. Process 1 has a mean defined as μ_1 and process 2 has a mean defined as μ_2. The null and alternative hypotheses are as follows:

$$H0: \mu_1 - \mu_2 \leq 0$$

$$H1: \mu_1 - \mu_2 > 0$$

The process variances are unknown bust assumed to be equal. Using a random samples of 25 observations from process 1 and 36 from observations from process 2, the sample means are 56 and 50 for populations 1 and 2. Can you reject the null hypothesis using a probability of Types I error = 0.05 if

a. the sample standard deviation from process 1 is 30 and from process 2 is 28.

b. the sample standard deviation from process 1 is 30 and from process 2 is 42.

10.9 For a random sample of 125 British entrepreneurs the mean number of job changes was 1.91 and the sample standard deviation was 1.32. For an independent random sample of 86 British corporate manages the mean number of job changes was 0.21 and the sample standard deviation was 0.53. Test the null hypothesis that the population means are equal against the alternative that the mean number of job changes is higher for British entrepreneurs than for British corporate managers.

10.10 A political science professor is interested in comparing the characteristics of students who do and do not vote in national elections. For a random sample of 114 students who claimed to have voted in the last presidential election, she found a mean grade point average of 2.71 and a standard deviation of 0.64. For an independent random sample of 123 students who did not vote, the mean grade point average was 2.79 and the standard deviation was 0.56. Test against a two-sided alternative the null hypothesis that the population means are equal by assuming that population variances are equal.

10.13. A publisher is interested in the effects on sales of college texts that include more than 100 data files. The publisher plans to produce 20 texts in the business area and randomly chooses 10 to have more than 100 data files. The remaining 10 are produced with at most 100 data files. For those with more than 100, first-year sales averaged 9,254, and the sample standard deviation was 2,107. For the books with at most 100, average first-year sales were 8,167, and the sample standard deviation was 1,681. Assuming that the two population distributions are normal with the same variance, test the null hypothesis that the population means are equal against the alternative that the true mean is higher for books with more than 100 data files.