MIDTERM II EXAM
Confidence Interval and Hypothesis Test

ISyE 2028 A

Prof. Yao Xie

Monday, Nov. 4th (8:05am-9:25pm) 2013.

Name _____

1 (30 points) A sample of 30 data observations has a sample mean $\bar{x} = 14.62$ and a sample standard deviation $s = 2.98$. Find the value of c for which $\mu \in (\infty, c)$ is a one-sided 95% t-interval for the population mean μ. Is it plausible that $\mu \leq 16$?

2 (30 points) A company is investigating how long it takes its drivers to deliver goods from its factory to a nearby port for export. Records reveal that with a standard specified driving route, the last $n = 48$ delivery times have a sample mean of $\bar{x} = 432.7$ minutes and a sample standard deviation of $s_x = 20.39$ minutes. A new driving route is proposed, and this has been tried $m = 10$ times with a sample mean of $\bar{y} = 403.5$ minutes and a sample standard deviation of $s_y = 15.62$ minutes. Is there evidence that the new route is quicker than the standard route? Answer the following questions:

   (a) State the null and the alternative hypothesis. What kind of test is this?

   (b) What conclusion do you reach about the null hypothesis? Please use the fixed significance level approach.

   (c) Compute the p-value. What conclusion you can reach using the p-value?

3 (40 points) Extracts of St. John's Wart are widely used to treat depression. An article in the Journal of the American Medical Association (April, 2001) titled "Effectiveness of St. John's Wart on Major Depression: A randomized controlled trial" compared the efficacy of a standard extract of St. John's Wart with a placebo in 200 outpatients diagnosed with major depression. Patients were randomly assigned to the two treatments (100 patients for the St. John's Wart extract and 100 for placebo). After eight weeks, 19 of the placebo-treated patients showed improvement, whereas 27 of those treated with St. John's Wart extract got treated.

   (a) State the null and alternative hypothesis. What kind of test is this?

   (b) What conclusion do you reach about the null hypothesis? Please use the fixed significance level approach.

   (c) Compute the p-value. What conclusion you can reach using the p-value?