Department of Mathematics and Statistics
Memorial University of Newfoundland

Stat 2560 - W2009 Assignment # 1 Due on 29 Jan 2009 (in Class)

Problem 1 (Chapter 8, Problem 29)
The amount of shaft wear (0.0001in) after a fixed mileage was determined for each of $n = 8$ interval combustion engines having copper lead as a bearing material, resulting in $\bar{x} = 3.72$ and $s = 1.25$.
(a) Assuming that the distribution of shaft wear is normal with mean μ, use the t-test at level 0.05 to test $H_0 : \mu = 3.5$ versus $H_a : \mu > 3.50$
(b) Using $\sigma = 1.25$, what is the type II error probability $\beta(\mu')$ of the test for the alternative $\mu' = 4.00$?

Problem 2 (Chapter 8, Problem 38(b))
It is known that roughly 2/3 of all human beings have a dominant right foot or eye. Is there also right-sided dominance in kissing behaviour? The article "Human Behavior Adult Persistance of Head Turning Asymmetry" (Nature 2003:771) reported that in a random sample of 124 kissing couples, both people in 80 of the couples tended to lean more on the right than the left.
(b) Does the result of the experiment suggest that the 2/3 figure is implausible for kissing behaviour? State and test the appropriate hypothesis.

Problem 3 (Chapter 9, Problem 19)
Suppose μ_1 and μ_2 are the true means stopping distance at 50 mph for cars of certain type equipeed with two different types of braking systems. Use the two sample t test at significant level 0.01 to test $H_0 : \mu_1 - \mu_2 = -10$ versus $H_a : \mu_1 - \mu_2 < -10$ for the following data:$m = 6, \bar{x} = 115.7, s_1 5.03, n = 6, \bar{y} = 129.3$ and $s_2 = 5.38$.

Problem 4 (Chapter 10, Problem 25)
Low-back pain (LBP) is a serious health problem in many industrial settings. The article "Isodynamic Evaluation of Trunk Muscles and Low-Back Pain Among Workers in a Steel Factory" (Ergonomics, 1995: 2107-2117) reported the accompanying summary data on lateral range of motion (degrees) for a sample of workers without a history of LBP and another sample with a history of this malady.

Condition	Sample Size	Sample Mean	Sample SD
No LBP	28	91.5	5.5
LBP	31	88.3	7.8

Calculate a 90% confidence interval for the difference between population mean extent of lateral motion for the two conditions. Does the interval suggest that population mean lateral motion differs for the two conditions? Is the message different if a confidence level of 95% is used?

Problem 5 (Chapter 10, Problem 41)
In an experiment designed to study the effects of illumination level on task performance , subjects were required to insert a fine-tipped probe into the eyeholes of ten needles in rapid succession both for a low light level with a black background and a higher level with a white background. Each data value is the time (sec) required to complete the task

Subject	1	2	3	4	5	6	7	8	9
Black	25.85	28.84	32.05	25.74	20.89	41.05	25.00	24.96	27.47
White	18.25	20.84	22.96	19.68	19.50	23.98	16.61	16.07	24.59

Does the data indicate that the higher level of illumination yield a decrease of more than 5 sec in true average task completion time? Test the appropriate hypothesis using the P-value approach.