Statistics 528 - Homework 8 Solutions

6.7
(a) (123.8-1.645(10/sqrt(15)), 123.8+1.645(10/sqrt(15)))=(119.6, 128.0)
(b) (123.8-1.96(10/sqrt(15)), 123.8+1.96(10/sqrt(15)))=(118.7, 128.9)
(c) (123.8-2.576(10/sqrt(15)), 123.8+2.576(10/sqrt(15)))=(117.1, 130.5)
(d) As the confidence level increases, the margin of error gets bigger.

6.10
(a) (123.8-1.96(10/sqrt(50)), 123.8+1.96(10/sqrt(50)))=(121.03, 126.57)
(b) The margin of error for the sample of 50 plots is smaller. More data provide more accurate estimate.
(c) In both cases, more data result in a narrower interval due to the decrease in the standard deviation of the estimate.

6.16 n= $(1.96*8000/500)^2$=983.45. n=984 is needed.

6.22
(a) From Table D, P(Z>=2.326)=0.01, so $z_{.01}$=2.326. The middle 98% of values of lie between -2.326 and 2.326 under the standard normal curve. A 98% confidence interval is (10.0023-2.326(0.0002/sqrt(5)), 10.0023+2.326(0.0002/sqrt(5)))=(10.0021, 10.0025)g
(b) n= $(2.326*0.0002/0.0001)^2$=21.64, so use n=22.

6.32
(a) Ho: μ=18 vs. Ha: μ<18, μ: the mean time for a mouse to take its way through a maze with a noise as stimulus.
(b) Ho: μ=50 vs. Ha: μ>50, μ: the mean score of the teaching assistant's students.
(c) Ho: μ=31% vs. Ha: μ≠31%, μ: the mean percent of total spending on housing of households in Cleveland area.

6.36
(a) Because the P-value 0.06>0.05, we fail to reject Ho at the 5% significance level. So, 10 would be inside a 95% confidence interval.
(b) With the P-value 0.06 < 0.1, we reject Ho at the 10% significance level. So, 10 would not fall inside a 90% confidence interval.

6.44
The observed z-test statistic is z=(11.2-6.9)/(2.7/sqrt(5))=3.56. Its P-value for the one-sided alternative is P(Z>=3.56)=0.0002, which is very small. We reject the null hypothesis that the mean is 6.9. So, we conclude that the mean number of new words is significantly larger than 6.9 at the level 0.05, and consequently the authors are different.

6.64
(a) (61.79-1.96(4.5/sqrt(24)), 61.79+1.96(4.5/sqrt(24))=(59.99,63.59)

(b) No, because 61.3 falls in the confidence interval.
(c) No, 63 is also inside the confidence interval.

7.6
(a) $H_{0:}$ $\mu = 0$ vs H_a: $\mu \neq 0$, where μ is the mean change in sales. We use the two-sided alternative because there is no information in the problem that suggests whether we are looking for an increase or a decrease.

(b) $t = \frac{\bar{x} - \mu}{s/\sqrt{n}} = \frac{0.048 - 0}{0.15/\sqrt{50}} = 2.263$

The t statistic is 2.263 and the p-value is 0.028 form software. Table D does not have 49 df, but for 50 df, our statistic is between 0.04 and 0.02. If we choose the significant level bigger than 0.028, then we have evidence to reject the null hypothesis. That is, the average sales for all stores different from last month.
(c) Certainly not. We are confident that the mean sales are up, but individual stores may either increase or decrease.

7.10
(a) 2.145
(b) 2.064
(c) 1.311

7.12
(a)19
(b)1.729 and 2.093
(c) 0.05 and 0.025
(d) because it is a one-sided test, 0.05 and 0.025
(e) t=1.87 is significant at 5%, because the statistic is larger than the table value (and our alternative is "greater than"). Not significant at 1% because it is not larger than 2.093.
(f) 0.0385