Total = 20 marks

STAT 2507 Assignment # 4 Fall 2011

Last Name _____, First _____

Student # _____ Your LAB Section _____

SOLUTIONS

Due date:

If your lab is on a Friday, please give your assignment to your TA, at the end of your lab on Friday November XXX XXXXX. If your lab is on a Monday, Tuesday, Wednesday, or Thursday, please hand in you assignment to me by 3:00 pm. on Friday November XXXXXX XXXXXX.

IMPORTANT NOTES:

1. **You MUST write your lab section in the space provided above (A1, A2, A3, etc.)**
2. **You MUST work by yourself NOT in groups.**

Minitab Question. *[Confidence interval for μ]*

Suppose $n = 9$ men are selected at random from a large population. Assume the heights of the men in this population are normal, with mean $\mu = 69$ inches and $\sigma = 3$ inches. Simulate the results of this selection 20 times and in each case find a 90% confidence interval for μ. The following commands may be used:

random 9 c1-c20;
normal 69 3.
zinterval 0.90 3 c1-c20

I had 18 (but any value larger than 14 is ok.)

[1] (a) How many of your intervals contain μ? _____.

[2] (b) Would you expect all 20 of the intervals to contain μ? NO. Why? $np = (20)(0.9) = 18$

[2] (c) Do all the intervals have the same width? Yes. Why (what is the theoretical width)?

$2 \times Z_{.05} \times (3/\sqrt{9}) = 3.29$

I had 9 but any number in (5, 15) is ok.

[1] (d) How many of your intervals contain the value 71? _____.

[2] (e) Suppose that you constructed 95% confidence intervals (instead of 90%). Would they be narrower or wider? wider

[2] (f) Suppose that you took samples of size $n = 100$ instead of $n = 9$. Would you expect more or fewer intervals to contain 71? fewer What about 69? same What about the width of the intervals for $n = 100$: Would they be narrower or wider than for $n = 9$? narrower Why $2 \times Z_{.05} \times \frac{3}{\sqrt{100}}$

[2] (g) Now suppose that n is as before (i.e., 9), but $\sigma = 7$. Would you expect more or fewer intervals to contain 71? more What about 69? same What about the width of the intervals when $\sigma = 7$: Would they be narrower or wider than the case where σ was 3? wider. Why? $2 \times Z_{.05} \times \frac{7}{\sqrt{9}}$

ALSO do the following questions:

1. Assume that candy boxes of a certain type are claimed to have a weight of 0.454 kilograms. A random sample of 35 such candy boxes produced an average weight of 0.458 kilograms and a standard deviation of 0.082 kilograms.

[2] **1(a)** A 99% confidence interval for the average weight, μ, of all such candy boxes is:

(a) (0.222, 0.494) **(b)** (0.422, 0.494) (*) **(c)** (0.222, 0.654) **(d)** (0.344, 0.564)

[2] **1(b)** If you make 200 such intervals, based on 200 independent samples of sizes 35, the probability that 10 of them will not capture the true mean μ can best be approximated by

(a) A standard normal distribution **(b)** A Binomial distribution with mean 198

(c) A Poisson distribution with mean 2 (*) **(d)** None of (a), (b), or (c).

[2] **2.** We want to compre the difference in mean daily intake of dairy products for adults in two different towns: A and B. Random samples of 30 adults from each town produced the following mean and standard deviations of the daily intakes of dairy products: $\bar{X}_1$=167.1, $\bar{X}_2$=140.9, S_1=24.3, and S_2=17.6. Find a 95% confidence interval for the difference in the mean dairy product intakes.

(a) (17.463, 41.345) **(b)** (15.463, 36.937) (*) **(c)** (0.222, 0.654) **(d)** (10.344, 48.564)

[2] **3.** Suppose that in a random sample of 1000 individuals from country A, 51 have a particular gene. The number is 56 for a random sample of size 1000 from country B. Construct a 99% confidence interval for the difference in the proportion of the people who carry this gene for the 2 countries.

(a) (0.0124, 0.1577) **(b)** $(-0.0161, 0.0344)$ **(c)** (-0.2244, 0.3451) **(d)** $(-0.0309, 0.0209)$(*)