Midterm Review

Monday, October 19, 2020 7:03 PM

8-10 MC 2 linear 1 calc cor R^2 stata out
3-4 probability + H testing
1-2 short answer

A study was conducted to examine the impact of speaking in public on college students. A class of 15 statistics students participated in the study. At the beginning of a lecture the students recorded their systolic blood pressure. During the lecture the instructor called on each student to stand and answer questions about topics in the lecture. After speaking, the students once again recorded their blood pressure. The average and standard deviation of before-after measurements are given in the table below. Determine if the blood pressure increased because of public speaking? Please state your null and alternate hypothesis, calculate test statistic, determine your decision and interpret the decision.

$df = 15-1=14 \to 2.14$

use as .05

Dependent sample

$t_0 = (\bar{D} - 0)/(S_D/\sqrt{n}) = (2.6-0)/(15.25/\sqrt{15})$
$= .66$

$.66 < 2.14$ so we fail to reject the null

Before	After	Difference
Mean = 125.3	Mean =127.9	Mean= 2.6
Std. Dev = 15.03	Std. Dev = 15.5	Std. Dev = 15.25

Problem 4

You draw a random sample of 12 orders of Chicken nuggets from the local McDonalds. You find 3 of the 12 have more calories than advertised. What is the probability of drawing 3 or more that fail to meet the published standard in a sample of 12 if the true failure rate is 0.05?

$p = .05 \quad q = 1-p = .95$ $\quad \binom{n}{x} p^x (1-p)^{n-x}$

$P(X \geq 3) = 1 - P(0) = 1 - P(0) - P(1) - P(2)$

$= 1 - \binom{12}{0}(.05)^0(.95)^{12} - \binom{12}{2}(.05)^2(.95)^{10}$

$\binom{n}{x} = n!/x!(n-x)!$

$\binom{12}{0}\ 12!/0!(12-0)! = 1$

Problem 5

Suppose 1 in 5 college interns turns out to be a great employee.

(a) How many interns would you need to try out to have a 90% chance of finding at least one great employee? Using the binomial, write the equation defining the solution then solve for n.

$p = 1/5 = .2 \qquad q = 1-.2 = .8$

$P(\text{No great employee}) = 1 - .9 = .1$

$.1 = \binom{n}{0}(.2)^0(.8)^{n-0} = n!/0!(n-0)! \to .1 = .8^n = n\log .8 =$

Problem 8

A factory has 22 identical machines. The expected number of break downs for each machine is 1.8 per year, with a standard deviation of 1.2.

(a) What are the mean and standard deviation of the total number of breakdowns each year?

(b) If each repair costs $1,000, what are the mean and standard deviation of annual repair costs?

$n = 22 \quad \mu = 1.8 \quad \sigma = 1.2$

$E(x) = 1.8 \cdot 22 = 39.6$
$V(x) = 22 \cdot 1.2^2 = 31.68$
$S(x) = \sqrt{31.68}$

mean cost $= 22 \cdot 1.8 \cdot 1000 = 39{,}600$
SD of cost $= 5.628 \cdot 1000 = 5628$