Stat 400/Math 463 Homework 9

Spring 2021 - Yu

Due: *Tues April 13 - 11:59pm*

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Exercise 1

Elle needs to eat some chocolate pudding to recharge her superpowers before the government scientists capture her. She finds a stash of "3.25 oz" pudding packs and weighs them on a scale. She takes a sample of 9 puddings and finds that they have the following weights in ounces:

3.1, 3.1, 3.2, 3.3, 3.2, 3.2, 3.0, 3.2, 3.3.

Assume that the weights of puddings are normally distributed

a) (1 point) Construct a 95% Confidence Interval for μ, the true mean of these pudding packs.

b) (0.5 point) Construct a 90% Confidence Interval for μ, the true mean of these pudding packs.

c) (1 point) Construct a 90% Confidence Interval for σ, the population standard deviation of weights of all these pudding packs. (two sided interval)

d) (1 point) Construct a 90% Confidence Upper bound for σ, the population standard deviation of weights of all these pudding packs.

Exercise 2

Dustin and Lucas decide to investigate Elle's claims about the pudding. They obtain a sample of 100 chocolate pudding packs and find that 70 of them contain less than 3.25oz of pudding.

a) (1 point) Construct a 99% CI for the overall proportion of pudding packs containing less than 3.25oz of pudding. Make a conclusion at $\alpha = 0.01$

b) (1 point) Construct a 92% CI for the overall proportion of pudding packs containing less than 3.25oz of pudding. Make a conclusion at $\alpha = 0.01$

Exercise 3

Let $0 \leq p \leq 1$ and X be a discrete random variable with probability mass function. Given a random sample (iid) of size n,

x	0	1	2	3
$f(x)$	$\frac{2p}{3}$	$\frac{p}{3}$	$\frac{2(1-p)}{3}$	$\frac{1-p}{3}$

a) (1 point) Find an expression for the Maximum Likelihood Estimator of p, $\hat{p}$.

b) (1 point) Find an expression for the Method of Moments estimator of p, $\tilde{p}$.

Exercise 4

Peele is interested in the average price of an entree at a French restaurant, but only has a random sample of 9 prices (prices are not listed on the menu). Using this random sample, Key calculates that a 90% confidence interval for the true mean is given by (65, 88). (You can assume the prices follow a normal distribution). Use this information to do the following:

a) (0.5 pt) Calculate $\bar{x}$. (Hint, what does a confidence interval look like?)

b) (1 pt) Calculate s.

c) (1 point) Construct a 95% confidence interval for the true mean price of all the entrees, μ.