

# HW 05

Stat140-04

**Due date** Dec 02 6PM EST on Gradescope

## Notes on grading

In general, you will receive full points on the question if (1) there are no errors in your solution AND (2) the solution is written in highly articulate Statistical and English language. Point will be taken off if there are errors, your writing of the solution is incomplete, or there are issues with writing organization.

## Problem 1

The use of topical painkiller ointment or gel rather than pills for pain relief was approved just within the last few years in the US for prescription use only. Insurance records show that the average copayment for a month's supply of topical painkiller ointment for regular users is \$30. A sample of  $n = 75$  regular users found a sample mean copayment of \$27.90.

(a) Identify the population parameter and the sample statistic and give the appropriate notation for each.

(b) If we take 1000 samples of size  $n = 75$  from the population of all copayments for a month's supply of topical painkiller ointment for regular users and plot the sample means on a dotplot, describe the shape you would expect to see in the plot and where it would be centered.

(c) How many dots will be on the dotplot you described in part (b)? What will each dot represent?

**Problem 2**

Different species can interact in interesting ways. One type of grass produces the toxin ergovaline at levels about 1.0 part per million in order to keep grazing animals away. However, a recent study has found that the saliva from a moose counteracts these toxins and makes the grass more appetizing (for the moose). Scientists estimate that, after treatment with moose drool, mean level of the toxin ergovaline (in ppm) on the grass is 0.183. The standard error for this estimate is 0.016.

Give a 95% confidence interval for the quantity being estimated. Interpret the interval in context.

**Problem 3**

In a study, a random sample of 2625 US adults were asked whether they agree or disagree that there is “only one true love for each person.” The study tells us that 735 of those polled said they agree with the statement. Define the parameter being estimated, give the point estimate, the margin of error, and find and interpret a 95% confidence interval.

#### Problem 4

A survey asked 827 randomly sampled registered voters in California “Do you support? Or do you oppose? Drilling for oil and natural gas off the Coast of California? Or do you not know enough to say?” Below is the distribution of responses, separated based on whether or not the respondent graduated from college.

	<i>College Grad</i>	
	Yes	No
Support	154	132
Oppose	180	126
Do not know	104	131
Total	438	389

- (a) What percent of college graduates and what percent of the non-college graduates in this sample do not know enough to have an opinion on drilling for oil and natural gas off the Coast of California?
- (b) Calculate a 95% confidence interval for the difference between the proportions of college graduates and non-college graduates who do not know enough to have an opinion on drilling for oil and natural gas off the Coast of California.

**Problem 5**

A sample is given. Indicate whether each option is a possible bootstrap sample from this original sample.

Original sample: 85, 72, 79, 97, 88.

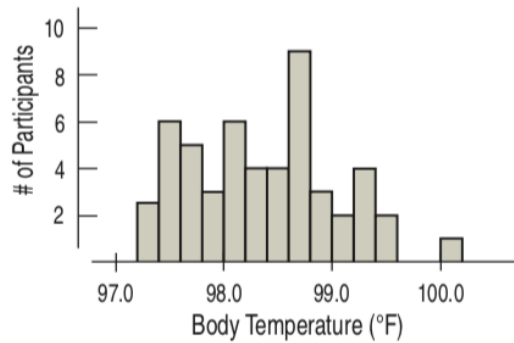
Do the values given constitute a possible bootstrap sample from the original sample?

- (a) 79, 79, 97, 85, 88
- (b) 72, 79, 85, 88, 97
- (c) 85, 88, 97, 72
- (d) 88, 97, 81, 78, 85
- (e) 97, 85, 79, 85, 97
- (f) 72, 72, 79, 72, 7

### Problem 6

A researcher measured the body temperatures of a randomly selected group of 52 adults. Here are summaries of the data he collected. We wish to estimate the average temperature among the adult population.

Summary	Temperature
Count	52
Mean	98.285
Median	98.200
MidRange	98.600
StdDev	0.6824
Range	2.800
IntQRange	1.050



- a) Check the conditions for using a student  $t$ -model

b) Find a 98% confidence interval for mean body temperature.

c) Explain the meaning of that interval.

d) Explain what “98% confidence” means in this context.

e) 98.6F is commonly assumed to be “normal.” Do these data suggest otherwise? Explain.