University of Potsdam
Statistics Exercises 2019-06-16   **Exercise ID Class activity 2**

Name:

Student ID:

Declaration: This submission is my work alone; I did not consult anyone about it, and I did not use any other unfair means for obtaining the answer(s). [Your signature below implies that you have made this declaration.]

Signature:

Grades:

1. (a)

(b)

(c)

(d)

(e)

2. (a)

(b) ⬜⬜⬜⬜⬜⬜ . ⬜⬜⬜

3. (a) ⬜⬜⬜⬜⬜⬜ . ⬜⬜⬜

(b) ⬜⬜⬜⬜⬜⬜ . ⬜⬜⬜

(c) ⬜⬜⬜⬜⬜⬜ . ⬜⬜⬜

(d) ⬜⬜⬜⬜⬜⬜ . ⬜⬜⬜

(e) ⬜⬜⬜⬜⬜⬜ . ⬜⬜⬜

(f) ⬜⬜⬜⬜⬜⬜ . ⬜⬜⬜

(g) ⬜⬜⬜⬜⬜⬜ . ⬜⬜⬜

(h) ⬜⬜⬜⬜⬜⬜ . ⬜⬜⬜

(i) ⬜⬜⬜⬜⬜⬜ . ⬜⬜⬜

1. [Give answers up to three decimal places for each case.]

   Take an independent random sample of size 143 from a normal distribution with mean 126, and standard deviation 30. Next, we are going to pretend we don't know the population parameters (the mean and standard deviation). We compute the MLEs of the mean and standard deviation using the data and get the sample mean 126.043 and the sample standard deviation 31.914. Compute:

   (a) the estimated standard error using the sample standard deviation provided above.

   (b) What are your degrees of freedom for the relevant t-distribution?

   (c) Calculate the **absolute** critical t-value for a 95% confidence interval using the relevant degrees of freedom you just wrote above.

   (d) Next, compute the lower bound of the 95% confidence interval using the estimated standard error and the critical t-value.

   (e) Finally, compute the upper bound of the 95% confidence interval using the estimated standard error and the critical t-value.

2. Suppose you have a sample of size 16 from a population with unknown mean and unknown standard deviation. The sample mean is 245 and the sample standard deviation 54.

   This information allows you to work out an estimate of the standard deviation of the sampling distribution ($SE_{\bar{x}}$).

   Find out the lower bound x1 and upper bound x2 such that 95% of the area under the curve of the SDSM is covered by x1 and x2. We will call this interval x1 to x2 the **95% confidence interval**. Write down

   (a) the lower bound of the interval (three decimal places)

   (b) the upper bound of the interval (three decimal places)

3. All responses should be to three decimal places.

   You are given a sample in the text file called `sample1.txt`. Read in the file into R:

```
> ## file location:
> fl<-"http://www.ling.uni-potsdam.de/~vasishth/data/sample1.txt"
> data<-read.table(fl,
+                   header=TRUE)
> colnames(data)

[1] "x"

> hist(data$x)
```

Carry out a t-test on this sample of scores using R; the null hypothesis (H_0) and alternative hypothesis (H_1) are:

$H_0 : \mu = 94$ and $H_1 : \mu \neq 94$.

We are going to do a t-test by hand. **All numerical answers must be to three decimal places**.

(a) the sample mean

(b) the sample standard deviation

(c) the sample size

(d) the standard error

(e) the **absolute** critical t-value

(f) the observed **absolute** t-value

(g) the p-value

(h) the lower bound of the 95% confidence interval

(i) the upper bound of the 95% confidence interval