The Questions

- Please answer all the questions within the Challenges from notes entitled "Module 2: Statistical Inference", available at `https://github.com/STATShunt/tia/blob/master/notes/module_2_statistical_inference_alt.pdf`.
- For clarifications, typos and hints, the Challenges may be updated *slightly* during class.
- Each Challenge question now ends with a marker that indicates whether your answer should be in your R script ($\mathbb{R}$ means R code and # means commented lines in your script) or your Word document ($\mathbb{W}$ means use Word). Directly after this marker there is a number to indicate many points the questions is worth towards your assignment total (2 means 2 points). A few questions require two different forms — use your common sense.
- For example, $\mathbb{R}1$ would mean you must produce R code in your script to answer the question and this question is worth a maximum of 1 point; #2 would mean you must produce commented-out text in your R script to answer the question and this question is worth a maximum of 2 points; and $\mathbb{W}5$ would mean you must answer the question inside Microsoft Word and this question is worth a maximum of 5 points.
- Your assignment grade will be calculated as 15% multiplied by the sum of your points divided by the total number of points available across all ten Challenges.

Background

- This assignment is worth 15% of your course grade. You can complete it in pairs or alone.
- **Deadline: 30th of May 30.**
- The assignment is to be answered with **one** R script and **one** Microsoft Word document. Give these files sensible names and upload both to MyLO.
- If you work in a pair, both people need to upload the files, indicate you are working in a pair and clearly signal who you partner is.
- Make sure that your answers are your own. In other words, if you get help from someone outside your pair, then do not blindly copy their answer or make cosmetic changes: make sure that the code works and the answers make sense!

Example challenge

Challenge 12

1. Generate 15 random normal numbers with a mean of 3 and sd of 33. Report the sample mean. ℝ1
2. Explain what a sample mean is and what it estimates. #2
3. Calculate the standard error of the mean. ℝ1
4. Generate a histogram for your sample and save it as a .png file. ℝ1
5. Insert the histogram into Word and give it an appropriate caption. 𝕎2

The next two pages show how to answer this example challenge. Each answer would score the maximum number of points indicated in the questions.

R script requirements

Required: I want to check your R code. So generate all the required data variables in your R script and leave them there. If you need to view the values of variables I will too. So include the variable name in your script so that running that line returns the variable's value in the R console. Your entire script should work when you close R and RStudio, then open it again and run everything.

Required: For the avoidance of doubt: all answers should be "dynamic code" rather than "hard-coded numbers". For example, if there is a variable holding some data and your answer uses that data, then the code in your answer should refer directly to the variable holding the data.

Required: Use as many commented lines of code (using the #) as you want.

Required: Make only one R script. In each section, clearly state which Challenge is being answered (do them in sequence) and which question number within the Challenge is being answered.

```
################################################################################
## CHALLENGE 12
################################################################################

# question 1
x<-rnorm(15,3,33)
mean(x) # this is the value asked for by the question

# question 2
# The mean of x is the sample average (sum of the values divided n).
# It is an estimate of the population mean.
# These comments comprise my answer to this question ...

# question 3
(var(x)/length(x))^0.5 # this is the value required to be found by the question

# question 4
png("myhist.png")  # called this whatever I wanted, saved in working directory
hist(x,main=NA)
dev.off()


################################################################################
## CHALLENGE 13
################################################################################
```

Word requirements

Required: Professionally format all tables and charts.

Required: All tables and charts should have captions that fully describe what is being displayed.

Required: Start each Challenge on a new page in Word. In each section, clearly state which Challenge is being answered (do them in sequence) and which question number within the Challenge is being answered.