

## Social Robotics

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### Exercise Sheet 3

Due: November 21, 2017, 10:00

#### Exercise 3.1 (Implementing Confidence Intervals and z-Test)

- (a) You are asked to write a R function *meanCI* that computes the mean along with its  $p\%$  confidence interval.
- The function takes as input the following parameters:
    - **x**: The data sample.
    - **p**: The confidence level.
  - The function should write to the console the mean and the confidence interval, e.g.,  $\bar{X} = 3.2, 95\% \text{ CI } [2.8, 3.6]$
  - *Hint*: You may need the inbuilt R functions `mean`, `sd`, `sqrt`, `length`, and `qnorm`.
- (b) While R does implement a lot of statistical tests, there is no function for z-Tests in the standard library. You are asked to fix that.
- Implement a function called `z.test`, which takes as input the following parameters:
    - **x**: The data sample.
    - **mu**: The population mean.
    - **sigma**: The population standard deviation.
    - **alternative**: Indicating whether the alternative hypothesis (i.e.,  $H_1$ ) is of type *lesser than*, *bigger than*, or *different*.
    - **alpha**: The significance level at which to reject  $H_0$ .
  - The function should write to the console the decision whether or not  $H_0$  is to be rejected plus the p-Value, e.g., *H0 rejected, p = 0.027*.
  - *Hint*: You may need the inbuilt R functions `mean`, `sqrt`, `length`, and `pnorm`.