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., \( H_0 \) rejected, \( p = 0.027 \).
- Hint: You may need the inbuilt R functions `mean`, `sqrt`, `length`, and `pnorm`. 