Examples

Do this example in R

Example2.: Let $X_1, X_2, \ldots, X_n \sim N(0, \sigma^2)$, where σ^2 is unknown number. How do we estimate the variance of the sample variance?

- Note: Use the sample variance instead of MLE.
- Start with

```
x <- rnorm(50)
```

Answer

```r
x <- rnorm(50)

boot_samp_var <- function(x){
  var(x)
}

n <- length(x)
norm_boot <- function(x, mle){
   rnorm(n, mean = 0, sd = sqrt(mle))
}

boot_n <- boot(x, boot_samp_var, R = 999, sim = "parametric", ran.gen = norm_boot, mle = var(x))
boot_n
```

```
##
## PARAMETRIC BOOTSTRAP
##
##
## Call:
## boot(data = x, statistic = boot_samp_var, R = 999, sim = "parametric",
##     ran.gen = norm_boot, mle = var(x))
##
##
## Bootstrap Statistics :
##     original       bias    std. error
## t1* 1.173793 -0.004671587   0.2362462
```

```r
sqrt(2/(n-1))*var(x) # theoretical estimated standard error of sample variance.
```

```
## [1] 0.2371421
```