Confidence intervals for means

M. Otiende

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load required packages

Confidence interval for a mean

Suppose we have a random sample of 10 recently graduated students who we asked about their mothly salary in Kenyan shillings. Imagine that this is the data we see, 94617,70606, 47594, 27026, 11078, 38898, 45033, 87151, 120514, and 40000. Estimate the mean salary of the graduated children. Find a 90 and 95 % confidence interval for the mean under the following two scenarios:

Setting 1 : Assume that incomes are normally distributed with unknown mean and SD = Ksh 30,000
Setting 2 : Same problem, only now we do not know the value for the standard deviation.

An incomplete R code is provided below, complete the code (commented lines with ??) based on the knowledge you have gathered about calculation of confidence intervals for means during the lecture.

SETTING 1

```
#----------------------------------
# SETTING 1
#----------------------------------
# input salaries
salaries <-c(94617,70606, 47594, 27026, 11078, 38898, 45033, 87151, 120514,40000)
n=length(salaries) # sample size
# calculate mean salary
mean.salary <-mean(salaries)
mean.salary
```

```
## [1] 58251.7
```

```
# 95% CI
#----------------
# significance level for 95% CI
alpha <- 0.05

# calculate standard error of mean salary
se.mean.salary <- 30000/sqrt(n)
```

```r
# calculate the margin of error for the 95% CI
error.margin <- abs(qnorm(alpha/2))*se.mean.salary

# calculate 95% CI
ci <- mean.salary + c(-error.margin, error.margin)
ci
```

```
## [1] 39657.85 76845.55
```

```r
## [1] 39657.85 76845.55


#YOUR TURN
# 90% CI
#----------------
# alpha <- ??
# se.mean.salary <- ??
# error.margin <- abs(qnorm(alpha/2))*se.mean.salary
# ci <- mean.salary + c(-error.margin, error.margin)
# ci
```

Report and interpret both the 90% and 95% confidence intervals that you obtain from setting 1

SETTING 2

```r
#----------------------------------
# SETTING 2
#----------------------------------
# input salaries
salaries <-c(94617,70606, 47594, 27026, 11078, 38898, 45033, 87151, 120514,40000)
n=length(salaries) # sample size
# calculate mean salary
mean.salary <-mean(salaries)
mean.salary
```

```
## [1] 58251.7
```

```r
# 95% CI
#----------------
# significance level for 95% CI
alpha <- 0.05

# calculate standard error of mean salary
#se.mean.salary <- ??

# calculate the margin of error for the 95% CI
error.margin <- abs(qnorm(alpha/2))*se.mean.salary

# calculate 95% CI
ci <- mean.salary + c(-error.margin, error.margin)
ci
```

```
## [1] 39657.85 76845.55
```

```
## YOUR TURN

# 90% CI
#-----------------
# alpha <- ??
# se.mean.salary <- ??
# error.margin <- abs(qnorm(alpha/2))*se.mean.salary
# ci <- mean.salary + c(-error.margin, error.margin)
# ci
```

Which if the 95% confidence intervals between setting 1 and 2 is wider and why do you think is the reason for this difference.