

CA30Jan.R

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```
# Question 1
# Define population
set.seed(2025)
population <- c("Ravenburg", "Corsair", "Sapphire", "Dallhoise", "Baggate",
"Bamboro", "Cherryport", "Foxwood", "Strommond", "Saturo")

# Part (a)
sample_without_replacement <- sample(population, size = 4, replace = FALSE)
print(sample_without_replacement)

## [1] "Dallhoise" "Ravenburg" "Cherryport" "Bamboro"

# Part (b) - Random sample of size 4 with replacement (run three times)
set.seed(NULL)
sample_with_replacement_1 <- sample(population, size = 4, replace = TRUE)
sample_with_replacement_2 <- sample(population, size = 4, replace = TRUE)
sample_with_replacement_3 <- sample(population, size = 4, replace = TRUE)

print(sample_with_replacement_1)

## [1] "Corsair" "Foxwood" "Ravenburg" "Dallhoise"

print(sample_with_replacement_2)

## [1] "Foxwood" "Dallhoise" "Corsair" "Strommond"

print(sample_with_replacement_3)

## [1] "Foxwood" "Strommond" "Foxwood" "Bamboro"

# Part (c) Explanation:
# "Without replacement" means once object is selected, it cannot be done
again.
# "With replacement" means each it can be repeated

# Question 2
library(Lock5Data)
data("PASeniors")
nrow(PASeniors)

## [1] 457

data("PASeniors")
Sleep1 <- PASeniors$Sleep1
# Part (a)
```

The parameter of interest is the population mean sleep hours, denoted as μ (mu).

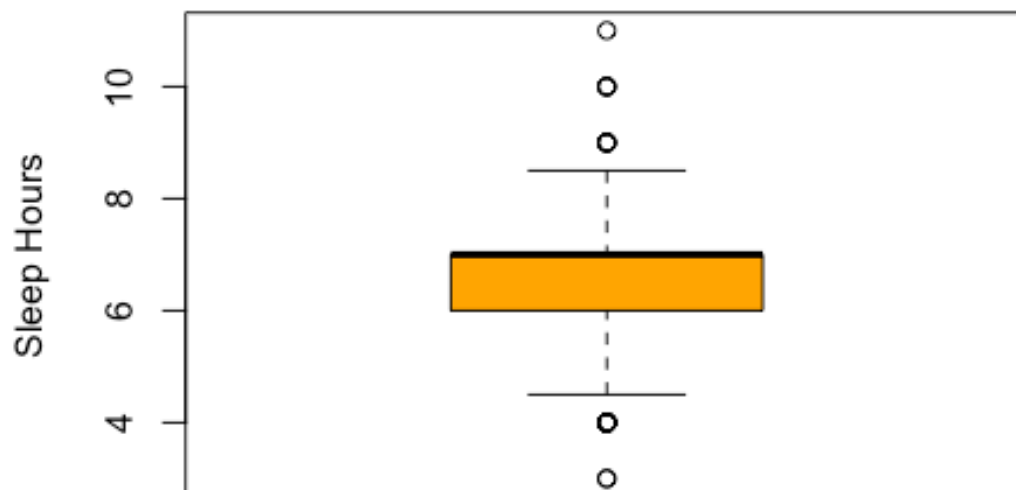
Part (b) - graphs

```
hist(Sleep1, main="Histogram of Sleep Hours", xlab="Sleep Hours", col="red",  
border="black")
```



```
boxplot(Sleep1, main="Boxplot of Sleep Hours", ylab="Sleep Hours",  
col="orange")
```

Boxplot of Sleep Hours



symmetry and outliers

```
summary(Sleep1)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.     NA's  
##      3.000   6.000   7.000   6.646   7.000   11.000         1
```

Part (c) - mean and median

```
mean_sleep <- mean(Sleep1, na.rm = TRUE)
```

```
median_sleep <- median(Sleep1, na.rm = TRUE)
```

```
print(paste("Mean Sleep Hours:", mean_sleep))
```

```
## [1] "Mean Sleep Hours: 6.64649122807018"
```

```
print(paste("Median Sleep Hours:", median_sleep))
```

```
## [1] "Median Sleep Hours: 7"
```

Notation: The mean is denoted as \bar{x} (x-bar).

Part (d) - Compute standard deviation and IQR

```
sd_sleep <- sd(Sleep1, na.rm = TRUE)
```

```
iqr_sleep <- IQR(Sleep1, na.rm = TRUE)
```

```
print(paste("Standard Deviation:", sd_sleep))
## [1] "Standard Deviation: 1.13093794192887"
print(paste("Interquartile Range:", iqr_sleep))
## [1] "Interquartile Range: 1"
# Notation: The standard deviation is denoted as s.

# Part (e) - Approximate range for 95% of sleep hours
lower_bound <- mean_sleep - 2 * sd_sleep
upper_bound <- mean_sleep + 2 * sd_sleep

print(paste("95% of students' sleep hours fall within:", round(lower_bound,
2), "to", round(upper_bound, 2)))
## [1] "95% of students' sleep hours fall within: 4.38 to 8.91"
```