PS: One Sample Z test for TAs

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R practice.

```
df_water <- read.csv('C:/Users/Guti/OneDrive - University of Vermont/Curriculum/07_ Cursos/NR-2400/Prob
head(df_water)
```

```
##       region  value
## 1 North West 1782.4
## 2 North East 1904.2
## 3   Midlands 3070.1
## 4    Anglian 1773.2
## 5     Thames 1528.3
## 6   Southern 1317.0
```

Define the parameters: mean and sd of the population, sample mean, sample size.

```
# Population mean (null hypothesis)
population_mean <- 1644
population_sd <- 497
```

```
# Calculate sample mean
sample_mean <- mean(df_water$value, na.rm=TRUE)
sample_mean
```

```
## [1] 1891.9
```

```
# Sample size
n <- length(df_water$value)
n
```

```
## [1] 10
```

Calculate the test statistic (z-score).

```
# Calculate the test statistic (z-score)
z_score <- (sample_mean - population_mean) / (population_sd / sqrt(n))
z_score
```

```
## [1] 1.577321
```

Define p-values.

```r
# Calculate p-value for two-tailed test
p_value_two_tail <- 2 * (1 - pnorm(abs(z_score)))
# Calculate the p-value for the right-tailed test
p_value_right_tailed <- 1 - pnorm(z_score)
# Calculate the p-value for the left-tailed test
p_value_left_tailed <- pnorm(z_score)
```

Print estimated paramenters.

```r
# Print results
cat("Z-Score:", z_score)
```

```
## Z-Score: 1.577321
```

```r
cat("Prob >|z|:", p_value_two_tail)
```

```
## Prob >|z|: 0.1147216
```

```r
cat("Prob > z:", p_value_right_tailed)
```

```
## Prob > z: 0.05736082
```

```r
cat("Prob < z:", p_value_left_tailed)
```

```
## Prob < z: 0.9426392
```

Compare with calculate critical z-value for one-tailed and two-tailed test (right-tailed).

```r
# Define significance level (alpha)
alpha <- 0.05
# Calculate critical z-value for one-tailed test (right-tailed)
critical_z_one_tailed <- qnorm(1 - alpha)
critical_z_one_tailed
```

```
## [1] 1.644854
```

```r
# Calculate critical z-values for two-tailed test
critical_z_two_tailed <- qnorm(1 - alpha / 2)
critical_z_two_tailed
```

```
## [1] 1.959964
```