M6: Problem Set One Sample Z-test for TAs

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R practice.

```
library(BSDA)
```

```
## Loading required package: lattice
```

```
##
## Attaching package: 'BSDA'
```

```
## The following object is masked from 'package:datasets':
##
##     Orange
```

Remember: We can also calculate the p-value using 2 * pnorm(abs(z), lower.tail=FALSE) for a two-sided test and pnorm(z) or pnorm(z, lower.tail=FALSE) for a one-sided test where z is the z-statistic.

```
# Given data
population_mean <- 85
population_sd <- 11.6
sample_mean <- 80.94
n <- 25

# Perform one-sample z-test
# Calculate the Z-test statistic
z <- (sample_mean - population_mean) / (population_sd / sqrt(n))
z
```

```
## [1] -1.75
```

```
# Two-tailed test, so multiply p-value by 2
p_value <- pnorm(z, lower.tail = T)
p_value
```

```
## [1] 0.04005916
```

Load the water pollution data into R.

```
##              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
## 7        South West 2278.5
## 8          EA Wales 1585.9
## 9          Scotland 2101.7
## 10 Northern Ireland 1577.7
```

```r
z.test(x= df_water$value,
alternative = "greater",
mu = 1644,
sigma.x = 497)
```

```
##
##  One-sample z-Test
##
## data:  df_water$value
## z = 1.5773, p-value = 0.05736
## alternative hypothesis: true mean is greater than 1644
## 95 percent confidence interval:
##  1633.386       NA
## sample estimates:
## mean of x
##    1891.9
```