Test 01: Z-test for a population mean (variance known)

# Load Required Packages:  
library(package = dplyr)  
library(package = DescTools)  
library(package = miscor)  
library(package = psych)  
  
# Load Required Data:  
data <- read.csv(file = "data/Data\_Test\_01.csv", header = TRUE)  
  
# Prepare Data:  
data\_84\_97 <- data %>% filter(Year != "1397-98")  
headTail(x = data\_84\_97, top = 2, bottom = 2)

|  |  |  |  |
| --- | --- | --- | --- |
| ## |  | Year | Razavi\_Khorasan |
| ## | 1 | 1384-85 | 2926 |
| ## | 2 | 1385-86 | 3280 |
| ## | … | … | … |
| ## | 12 | 1395-96 | 3426 |
| ## | 13 | 1396-97 | 3310 |

data\_97\_98 <- data %>% filter(Year == "1397-98")  
headTail(x = data\_97\_98, top = 2, bottom = 2)

|  |  |  |  |
| --- | --- | --- | --- |
| ## |  | Year | Razavi\_Khorasan |
| ## | 1 | 1397-98 | 3755 |
| ## | 2 | 1397-98 | 4843 |
| ## | … | … | … |
| ## | 49 | 1397-98 | 2471 |
| ## | 50 | 1397-98 | 2802 |

# Assumption Checking:  
# 1. It is necessary that the population variance is known.  
pop\_var <- var(x = data\_84\_97$Razavi\_Khorasan)

## 407642.7

# 2. The test is accurate if the population is normally distributed.  
shapiro.test(data\_84\_97$Razavi\_Khorasan)

## Shapiro-Wilk normality test  
## data: data\_84\_97$Razavi\_Khorasan  
## W = 0.90031, p-value = 0.135

# setting initial parameter values:  
mu\_1396\_97 = data\_84\_97[which(data\_84\_97$Year == "1396-97"), "Razavi\_Khorasan"]  
  
sd\_pop = sd(data\_84\_97$Razavi\_Khorasan)  
  
# use ZTest function:  
ZTest(x = data\_97\_98$Razavi\_Khorasan, alternative = "two.sided",  
 mu = mu\_1396\_97, sd\_pop = sd\_pop, conf.level = 0.95)

## One Sample z-test  
## data: data\_97\_98$Razavi\_Khorasan  
## z = 1.684, Std. Dev. Population = 638.47, p-value = 0.092  
## alternative hypothesis: true mean is not equal to 3310  
## 95 percent confidence interval:  
## 3258.109 3639.051  
## sample estimates:  
## mean of x: 3462.08

# use ZTest function:  
ZTest(x = data\_97\_98$Razavi\_Khorasan, alternative = "greater",  
 mu = mu\_1396\_97, sd\_pop = sd\_pop, conf.level = 0.95)

## One Sample z-test  
## data: data\_97\_98$Razavi\_Khorasan  
## z = 1.684, Std. Dev. Population = 638.47, p-value = 0.046  
## alternative hypothesis: true mean is not equal to 3310  
## 95 percent confidence interval:  
## 3313.561 Inf  
## sample estimates:  
## mean of x: 3462.08