

# AE10 - Uncertainty

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```
# load packages
library(tidyverse)
library(tidymodels)
library(distributional)
library(ggdist)
library(readr)

everest <- read_csv("~/Downloads/DSC-260/csv_data/everest.csv")

# set theme for ggplot2
ggplot2::theme_set(ggplot2::theme_minimal(base_size = 16))
```

## AE10-A

```
set.seed(344567)

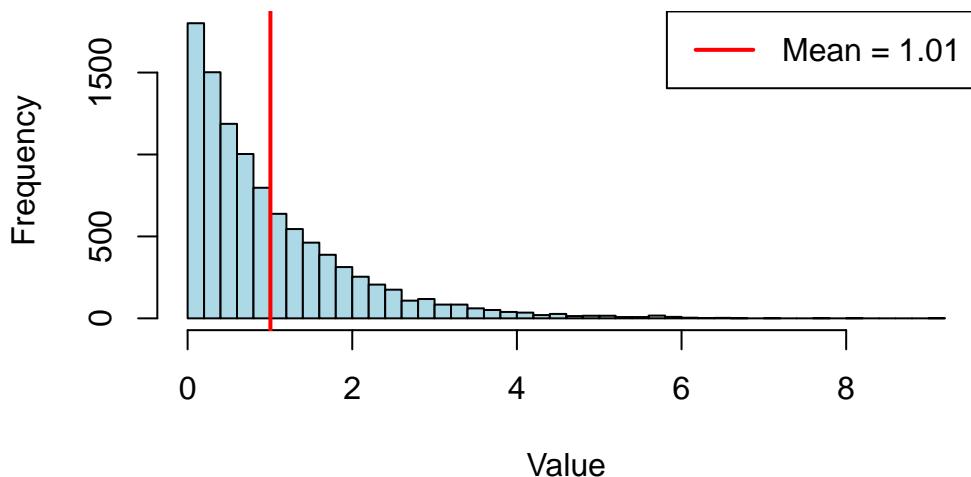
pop <- rexp(10000, rate = 1)

pop_mean <- mean(pop)

pop_sd <- sd(pop)

hist(pop, breaks = 50, col = "lightblue", main = "pop Distribution", xlab = "Value")
abline(v = pop_mean, col = "red", lwd = 2)
legend("topright", legend = paste("Mean =", round(pop_mean, 2)), col = "red", lwd = 2)
```

## pop Distribution



```
sample1 <- sample(pop, size = 40)
sample1_mean <- mean(sample1)
sample1_sd <- sd(sample1)

cat("Sample mean:", sample1_mean, "\nSample SD:", sample1_sd, "\n\n")
```

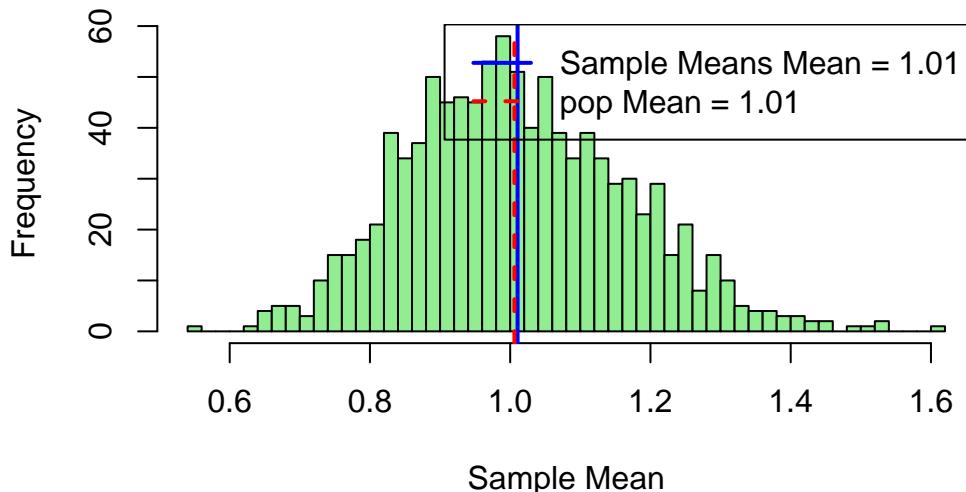
Sample mean: 1.155018  
Sample SD: 1.376084

```
sample_means <- replicate(1000, {
  s <- sample(pop, size = 40)
  mean(s)
})

sampling_mean <- mean(sample_means)
sampling_sd <- sd(sample_means)

hist(sample_means, breaks = 40, col = "lightgreen", main = "Sampling Distribution of the Mean")
abline(v = sampling_mean, col = "blue", lwd = 2)
abline(v = pop_mean, col = "red", lwd = 2, lty = 2)
legend("topright", legend = c(paste("Sample Means Mean =", round(sampling_mean, 2)),
                             paste("pop Mean =", round(pop_mean, 2))),
       col = c("blue", "red"), lwd = 2, lty = c(1, 2))
```

## Sampling Distribution of the Mean



## AE10-B

```
quantile(everest$highpoint_metres, probs = c(0.025, 0.975), na.rm = TRUE)
```

2.5% 97.5%  
6200 8850

```
t.test(highpoint_metres ~ sex, data = everest, conf.level = 0.95)
```

Welch Two Sample t-test

```
data: highpoint_metres by sex  
t = -4.6136, df = 1370.6, p-value = 4.326e-06  
alternative hypothesis: true difference in means between group F and group M is not equal to  
95 percent confidence interval:  
-176.06535 -71.01027  
sample estimates:  
mean in group F mean in group M  
8264.694 8388.232
```

The last part won't run for some reason, and it's driving me insane.