

R Notebook

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```
my_sample <- c(21, 29, 25, 19, 24, 22, 25, 26, 25, 29)

(x_bar <- mean(my_sample)) # original sample mean
```

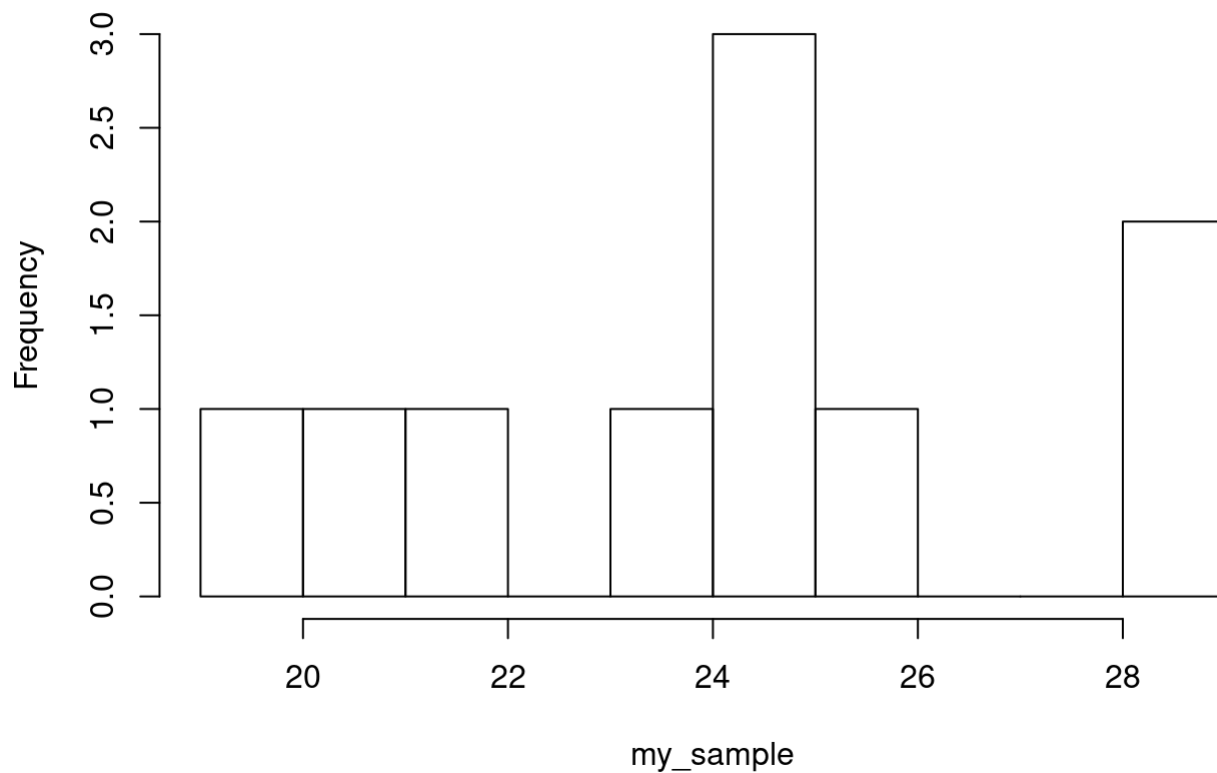
```
## [1] 24.5
```

```
(s <- sd(my_sample)) # standard deviation of the sample
```

```
## [1] 3.205897
```

```
n <- length(my_sample) # original sample size
hist(my_sample, breaks = 10) # histogram my sample
```

Histogram of my_sample



```
# number of bootstrap replicates = 10000
bootstrap_dist <- SDS100::do_it(10000) * {
  curr_boot <- sample(my_sample, n, replace = TRUE) # take bootstrap samples
  mean(curr_boot) # calculate bootstrap means
}
(se <- sd(bootstrap_dist)) # se (standard error) is sd of sampling distribution
```

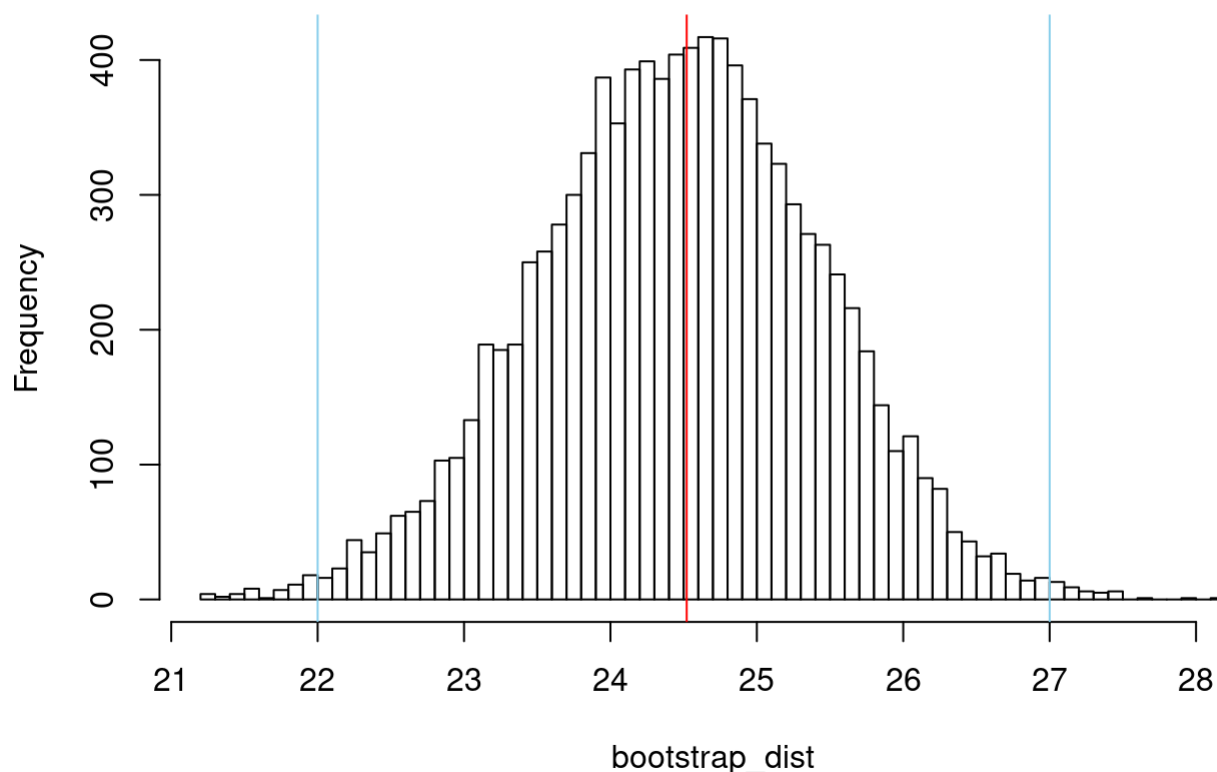
```
## [1] 0.960872
```

```
(mb <- mean(bootstrap_dist)) # mean of the boot would be similar to sample mean
```

```
## [1] 24.52089
```

```
hist(bootstrap_dist, breaks = 100)
abline(v = mb, col = "red")
abline(v = quantile(bootstrap_dist, c(0.005, 0.995)), col = "skyblue")
```

Histogram of bootstrap_dist



```
# Confidence intervals using quantiles
print("90% CI using quantiles")
```

```
## [1] "90% CI using quantiles"
```

```
(q <- round(quantile(bootstrap_dist, c(0.05, 0.95)), 2))
```

```
## 5% 95%  
## 22.9 26.1
```

```
print("margin of error")
```

```
## [1] "margin of error"
```

```
(me <- round(q[[2]] - mb, 2))
```

```
## [1] 1.58
```

```
print("95% CI using quantiles")
```

```
## [1] "95% CI using quantiles"
```

```
(q <- round(quantile(bootstrap_dist, c(0.025, 0.975)), 2))
```

```
## 2.5% 97.5%  
## 22.6 26.3
```

```
print("margin of error")
```

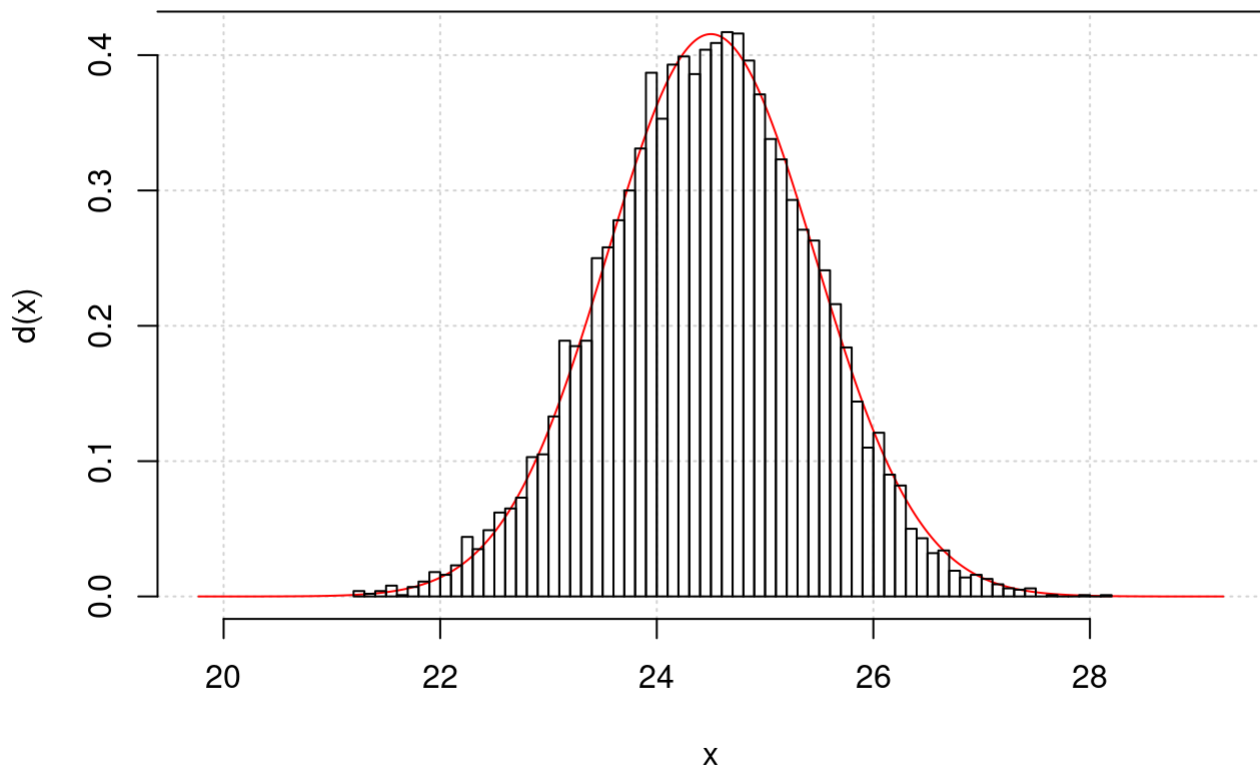
```
## [1] "margin of error"
```

```
(me <- round(q[[2]] - mb, 2))
```

```
## [1] 1.78
```

```
# inference of the population distribution  
population_distr <- distr::Norm(x_bar, round(se, 2))  
plot(population_distr, to.draw.arg = "d", bty = "n",  
      panel.first = grid(lwd = 1), lwd = 1, vertical = FALSE,  
      col.points = c("red", "black"), cex.points = 1.8, col = "red")  
hist(bootstrap_dist, prob = TRUE, breaks = 100, add = TRUE)
```

Density of Norm(24.5, 0.96)



addressing mode	95% confidence interval	margin or error	distribution
000(MOV)	(22.6, 26.3)	24.5 ± 1.78	Norm(24.5, 0.96)
001	(..., ...)	...	Norm(..., ...)
...			