

# case4

## Case 4

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```
install.packages("tidyverse")
```

Installing package into '/home/hfduran/R/x86\_64-pc-linux-gnu-library/4.3'  
(as 'lib' is unspecified)

```
install.packages("ggplot2")
```

Installing package into '/home/hfduran/R/x86\_64-pc-linux-gnu-library/4.3'  
(as 'lib' is unspecified)

```
library(tidyverse)
```

```
-- Attaching core tidyverse packages ----- tidyverse 2.0.0 --
```

```
v dplyr      1.1.4      v readr      2.1.5
```

```
v forcats   1.0.0      v stringr    1.5.1
```

```
v ggplot2    3.5.0      v tibble     3.2.1
```

```
v lubridate  1.9.3      v tidyr      1.3.1
```

```
v purrr      1.0.2
```

```
-- Conflicts ----- tidyverse_conflicts() --
```

```
x dplyr::filter() masks stats::filter()
```

```
x dplyr::lag()     masks stats::lag()
```

```
i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become
```

```

library(ggplot2)
source("../utils.R")

df <- readRDS("cripto.rds")

df_dogecoin = subset(df, name=="Dogecoin")
df_stellar = subset(df, name=="Stellar")
df_xrp = subset(df, name=="XRP")

calc_returns = function(data) {
  for(i in 2:nrow(data)) {
    data$return[i] = log(data$close[i] / data$close[i-1])
  }

  clean_data = data[-1,]

  return (clean_data)
}

df_dogecoin$return = 0
df_stellar$return = 0
df_xrp$return = 0

df_dogecoin_ret = calc_returns(df_dogecoin)
df_stellar_ret = calc_returns(df_stellar)
df_xrp_ret = calc_returns(df_xrp)

```

## #NEW VERSION

```

normal_error <- function(alpha, n, pop_stdev) {
  z <- qnorm(1 - alpha)
  stdev <- pop_stdev
  return (z * stdev/sqrt(n))
}

student_error <- function(data, alpha) {
  n <- length(data)
  t <- qt(1 - alpha, n - 1)
  stdev <- sample_stdev(data)

```

```

    return (t * stdev/sqrt(n))
}

normal_graph <- function(mean, sd, error, title, xlabel, ylabel) {
  x <- seq(-0.01 + mean, 0.01 + mean, by = .00001)
  y <- dnorm(x, mean = mean, sd = sd)
  df_distr <- data.frame(x = x, y = y)
  ggplot(df_distr, aes(x = x, y = y)) +
    geom_point() +
    ggtitle(title) +
    xlab(xlabel) +
    ylab(ylabel) +
    geom_vline(xintercept = (mean - error)) +
    geom_vline(xintercept = (mean + error))
}

```

#Normal - 95%

```

dogecoin_ret_mean = mean(df_dogecoin_ret$return)
stellar_ret_mean = mean(df_stellar_ret$return)
xrp_ret_mean = mean(df_xrp_ret$return)

dogecoin_ret_sd = 0.020
stellar_ret_sd = 0.015
xrp_ret_sd = 0.012

dogecoin_ret_mean_error = normal_error(0.025, length(df_dogecoin_ret$return), dogecoin_ret_sd)
stellar_ret_mean_error = normal_error(0.025, length(df_stellar_ret$return), stellar_ret_sd)
xrp_ret_mean_error = normal_error(0.025, length(df_xrp_ret$return), xrp_ret_sd)

print(paste(
  "Mean confidence interval for Dogecoin returns (95%):",
  "[",
  round(dogecoin_ret_mean - dogecoin_ret_mean_error, 8),
  ";",
  round(dogecoin_ret_mean + dogecoin_ret_mean_error, 8),
  "]"
))

```

```
[1] "Mean confidence interval for Dogecoin returns (95%): [ 0.00019331 ; 0.00203607 ]"
```

```

print(paste(
  "Mean confidence interval for Stellar returns (95%):",
  "[",
  round(stellar_ret_mean - stellar_ret_mean_error, 8),
  ";",
  round(stellar_ret_mean + stellar_ret_mean_error, 8),
  "]"
))

```

```
[1] "Mean confidence interval for Stellar returns (95%): [ 0.00193211 ; 0.00341276 ]"
```

```

print(paste(
  "Mean confidence interval for XRP returns (95%):",
  "[",
  round(xrp_ret_mean - xrp_ret_mean_error, 8),
  ";",
  round(xrp_ret_mean + xrp_ret_mean_error, 8),
  "]"
))

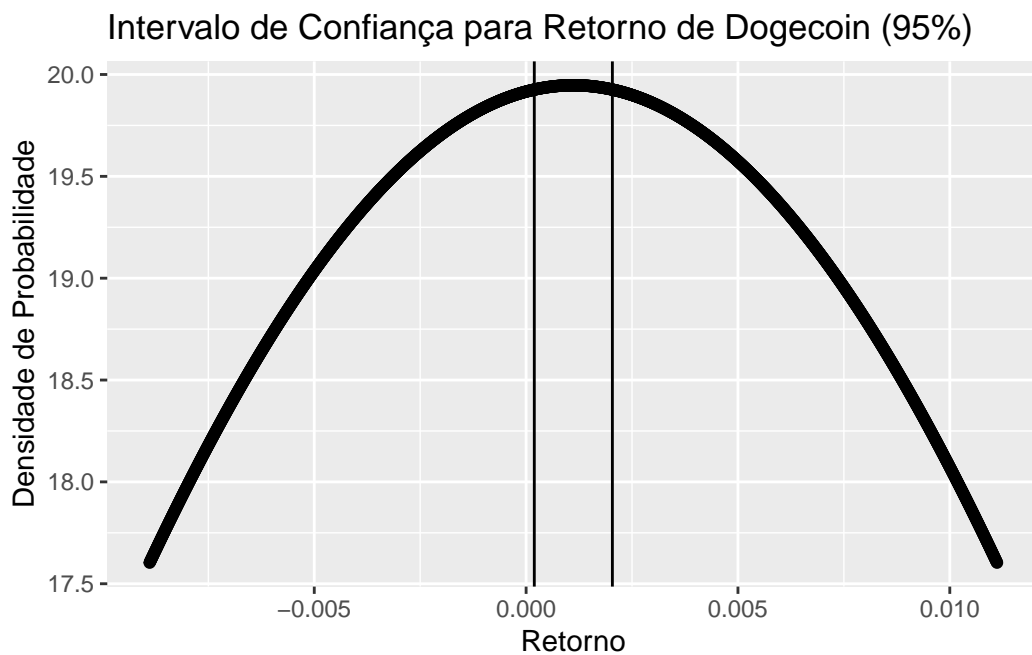
```

```
[1] "Mean confidence interval for XRP returns (95%): [ 0.00161111 ; 0.00267826 ]"
```

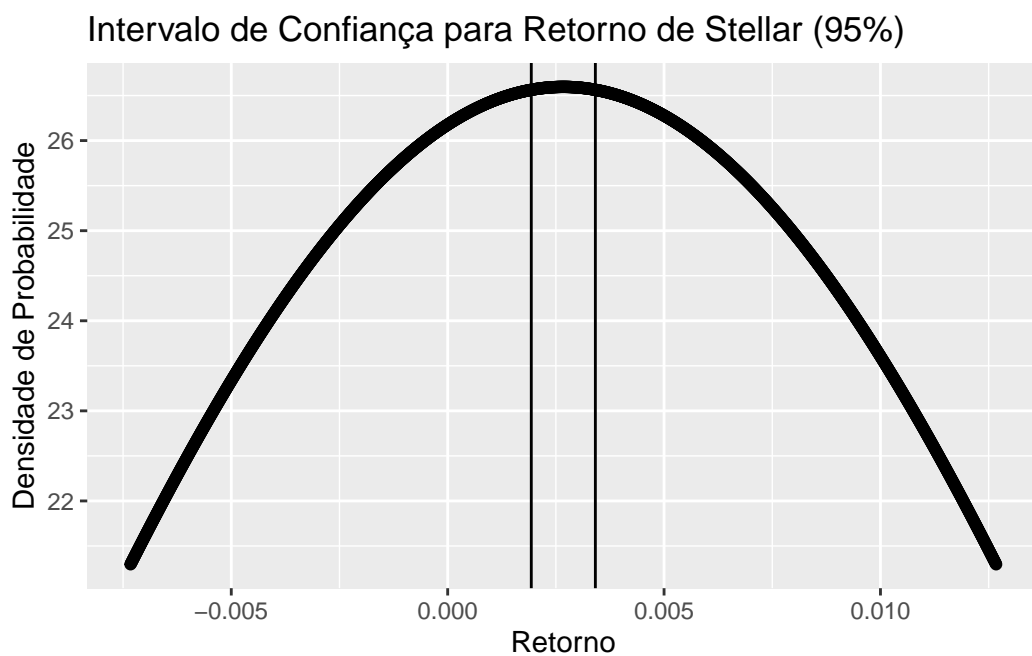
```

normal_graph(dogecoin_ret_mean, dogecoin_ret_sd, dogecoin_ret_mean_error, "Intervalo de Co

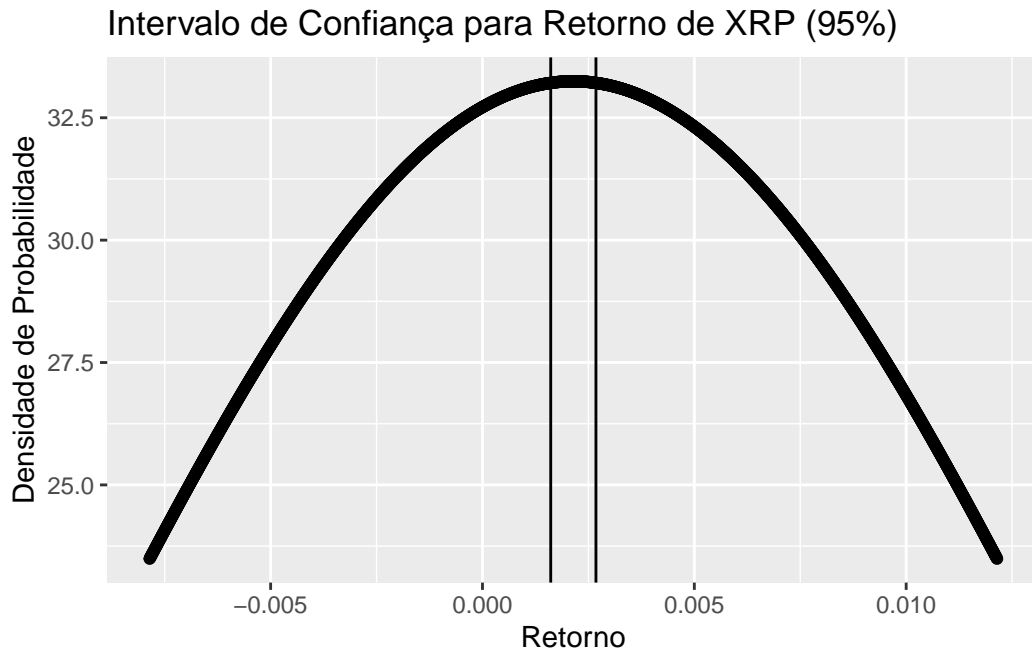
```



```
normal_graph(stellar_ret_mean, stellar_ret_sd, stellar_ret_mean_error, "Intervalo de Confi
```



```
normal_graph(xrp_ret_mean, xrp_ret_sd, xrp_ret_mean_error, "Intervalo de Confiança para Re
```



#Normal - 90%

```
dogecoin_ret_mean = mean(df_dogecoin_ret$return)
stellar_ret_mean = mean(df_stellar_ret$return)
xrp_ret_mean = mean(df_xrp_ret$return)

dogecoin_ret_sd = 0.020
stellar_ret_sd = 0.015
xrp_ret_sd = 0.012

dogecoin_ret_mean_error = normal_error(0.05, length(df_dogecoin_ret$return), dogecoin_ret_sd)
stellar_ret_mean_error = normal_error(0.05, length(df_stellar_ret$return), stellar_ret_sd)
xrp_ret_mean_error = normal_error(0.05, length(df_xrp_ret$return), xrp_ret_sd)

print(paste(
  "Mean confidence interval for Dogecoin returns (90%):",
  "[",
  round(dogecoin_ret_mean - dogecoin_ret_mean_error, 8),
  ";",
  round(dogecoin_ret_mean + dogecoin_ret_mean_error, 8),
  "]"
))
```

```
[1] "Mean confidence interval for Dogecoin returns (90%): [ 0.00034144 ; 0.00188793 ]"
```

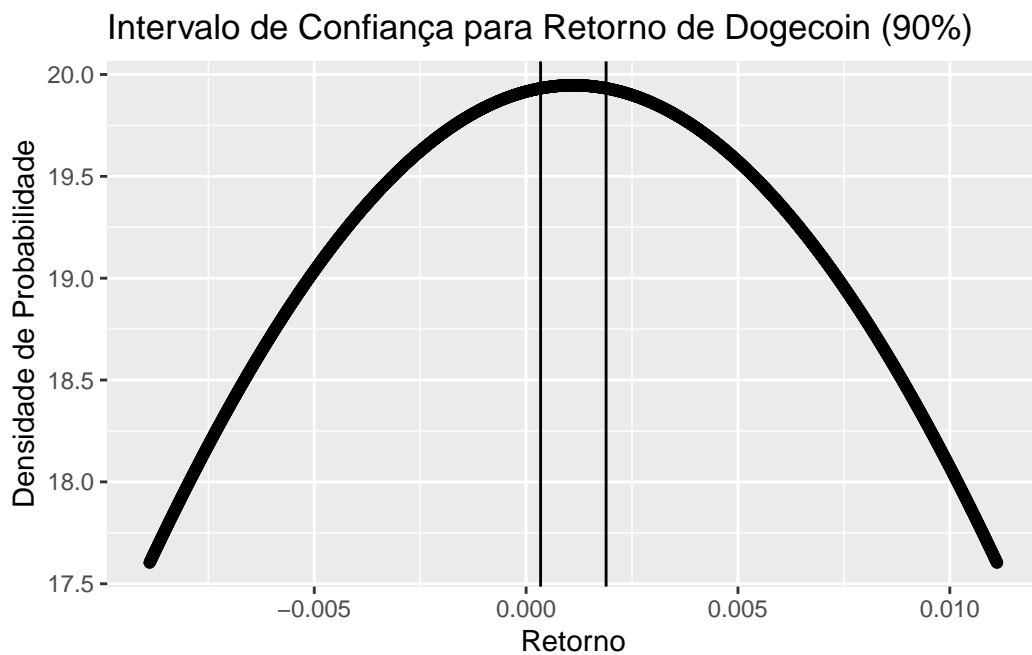
```
print(paste(
  "Mean confidence interval for Stellar returns (90%):",
  "[",
  round(stellar_ret_mean - stellar_ret_mean_error, 8),
  ";",
  round(stellar_ret_mean + stellar_ret_mean_error, 8),
  "]"
))
```

```
[1] "Mean confidence interval for Stellar returns (90%): [ 0.00205113 ; 0.00329374 ]"
```

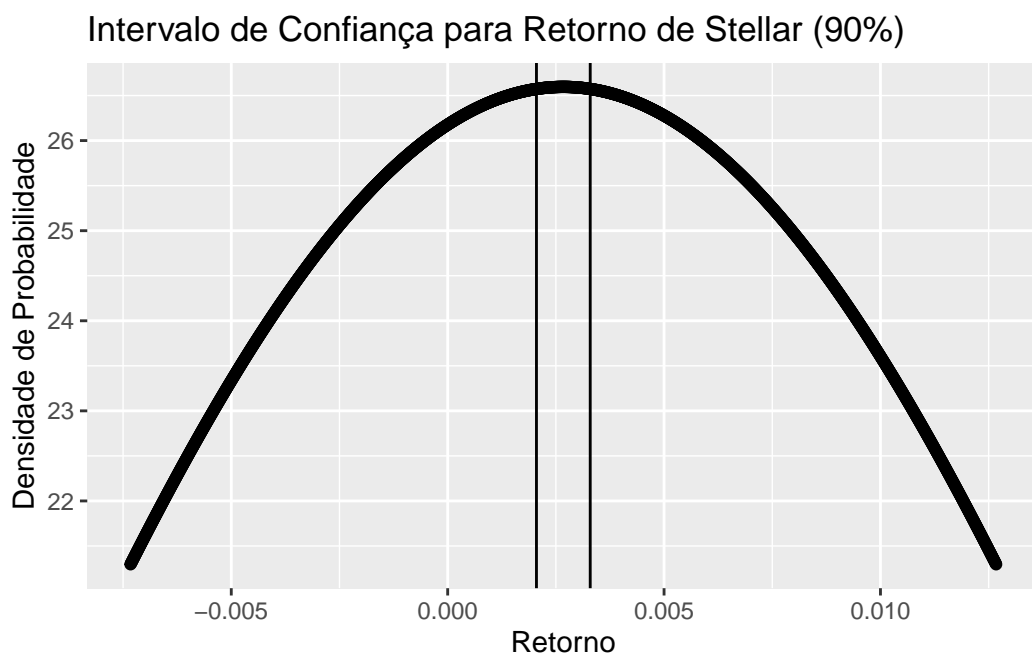
```
print(paste(
  "Mean confidence interval for XRP returns (90%):",
  "[",
  round(xrp_ret_mean - xrp_ret_mean_error, 8),
  ";",
  round(xrp_ret_mean + xrp_ret_mean_error, 8),
  "]"
))
```

```
[1] "Mean confidence interval for XRP returns (90%): [ 0.0016969 ; 0.00259247 ]"
```

```
normal_graph(dogecoin_ret_mean, dogecoin_ret_sd, dogecoin_ret_mean_error, "Intervalo de Co
```

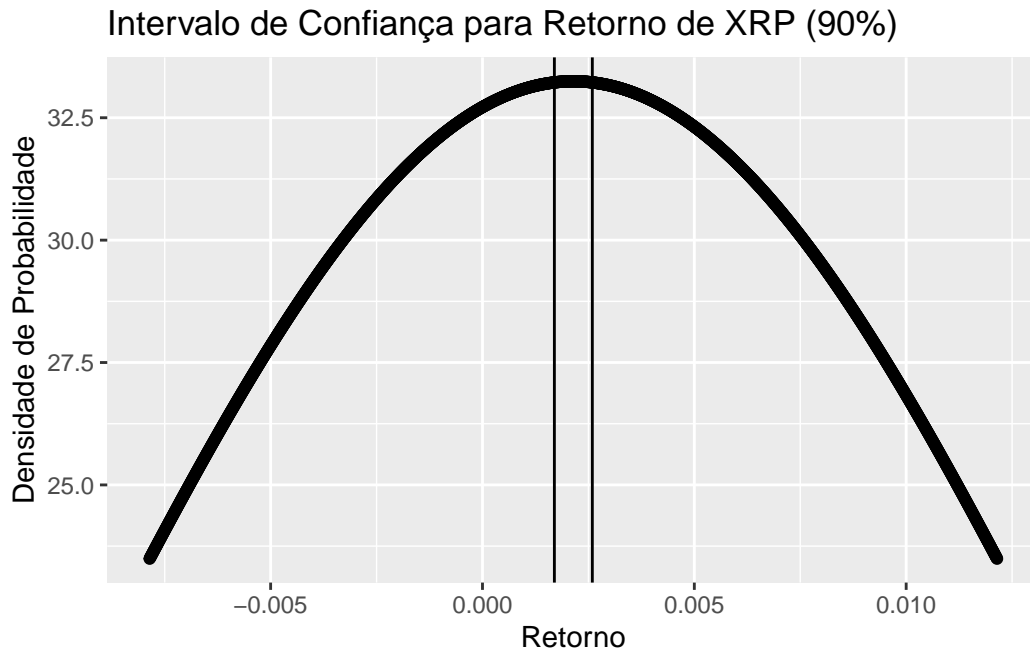


```
normal_graph(stellar_ret_mean, stellar_ret_sd, stellar_ret_mean_error, "Intervalo de Confi
```



```
normal_graph(xrp_ret_mean, xrp_ret_sd, xrp_ret_mean_error, "Intervalo de Confiança para Re
```





#Normal - 99%

```
dogecoin_ret_mean = mean(df_dogecoin_ret$return)
stellar_ret_mean = mean(df_stellar_ret$return)
xrp_ret_mean = mean(df_xrp_ret$return)

dogecoin_ret_sd = 0.020
stellar_ret_sd = 0.015
xrp_ret_sd = 0.012

dogecoin_ret_mean_error = normal_error(0.005, length(df_dogecoin_ret$return), dogecoin_ret_sd)
stellar_ret_mean_error = normal_error(0.005, length(df_stellar_ret$return), stellar_ret_sd)
xrp_ret_mean_error = normal_error(0.005, length(df_xrp_ret$return), xrp_ret_sd)

print(paste(
  "Mean confidence interval for Dogecoin returns (99%):",
  "[",
  round(dogecoin_ret_mean - dogecoin_ret_mean_error, 8),
  ";",
  round(dogecoin_ret_mean + dogecoin_ret_mean_error, 8),
  "]"
))
```

```
[1] "Mean confidence interval for Dogecoin returns (99%): [ -9.621e-05 ; 0.00232559 ]"
```

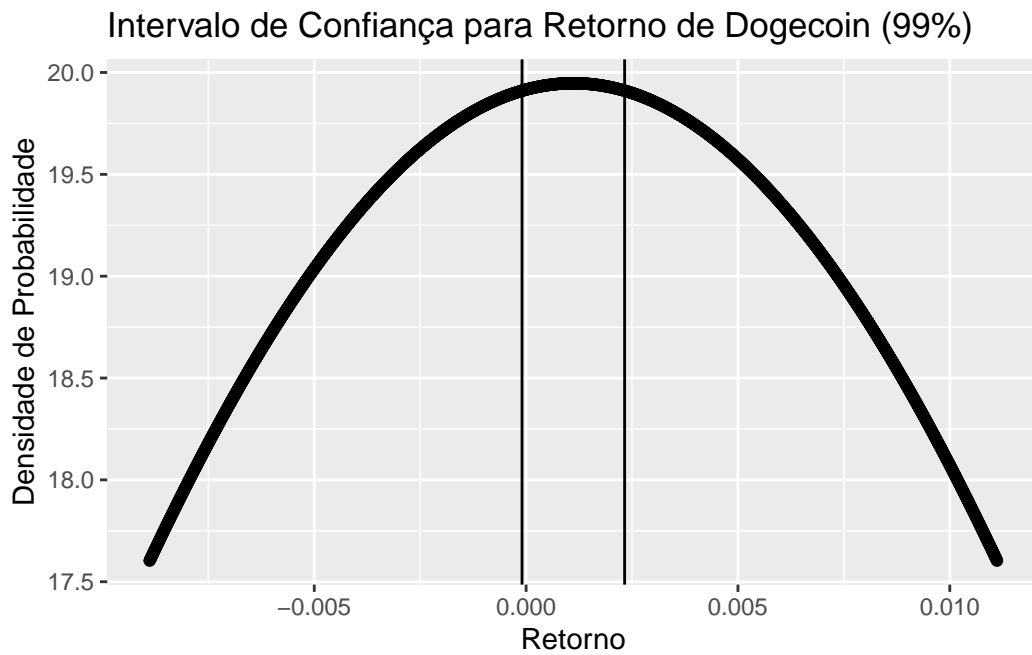
```
print(paste(
  "Mean confidence interval for Stellar returns (99%):",
  "[",
  round(stellar_ret_mean - stellar_ret_mean_error, 8),
  ";",
  round(stellar_ret_mean + stellar_ret_mean_error, 8),
  "]"
))
```

```
[1] "Mean confidence interval for Stellar returns (99%): [ 0.00169948 ; 0.00364539 ]"
```

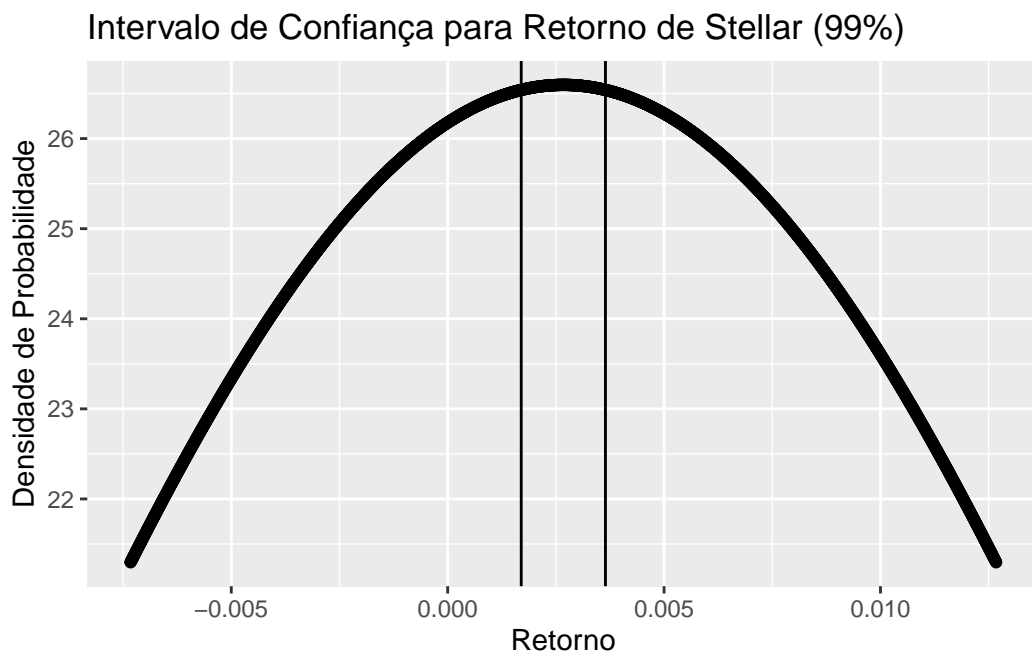
```
print(paste(
  "Mean confidence interval for XRP returns (99%):",
  "[",
  round(xrp_ret_mean - xrp_ret_mean_error, 8),
  ";",
  round(xrp_ret_mean + xrp_ret_mean_error, 8),
  "]"
))
```

```
[1] "Mean confidence interval for XRP returns (99%): [ 0.00144345 ; 0.00284592 ]"
```

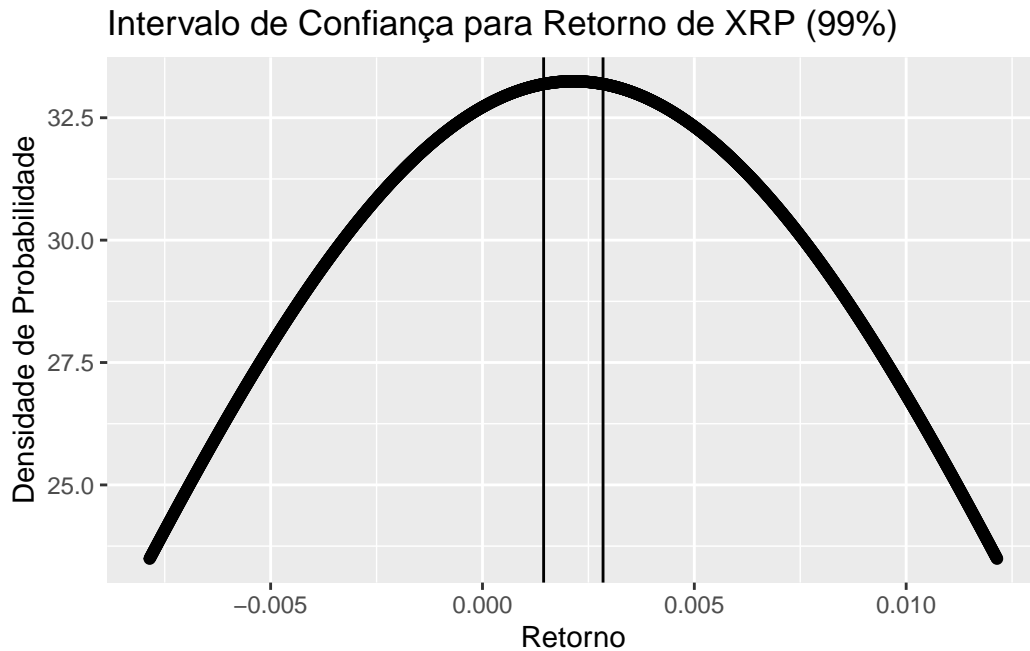
```
normal_graph(dogecoin_ret_mean, dogecoin_ret_sd, dogecoin_ret_mean_error, "Intervalo de Co
```



```
normal_graph(stellar_ret_mean, stellar_ret_sd, stellar_ret_mean_error, "Intervalo de Confi
```



```
normal_graph(xrp_ret_mean, xrp_ret_sd, xrp_ret_mean_error, "Intervalo de Confiança para Re
```



#Student - 95%

```
dogecoin_ret_mean = mean(df_dogecoin_ret$return)
stellar_ret_mean = mean(df_stellar_ret$return)
xrp_ret_mean = mean(df_xrp_ret$return)

dogecoin_ret_mean_error = student_error(df_dogecoin_ret$return, 0.025)
stellar_ret_mean_error = student_error(df_stellar_ret$return, 0.025)
xrp_ret_mean_error = student_error(df_xrp_ret$return, 0.025)

print(paste(
  "Mean confidence interval for Dogecoin returns (95%):",
  "[",
  round(dogecoin_ret_mean - dogecoin_ret_mean_error, 8),
  ";",
  round(dogecoin_ret_mean + dogecoin_ret_mean_error, 8),
  "]"
))
```

```
[1] "Mean confidence interval for Dogecoin returns (95%): [ -0.0026593 ; 0.00488867 ]"
```

```

print(paste(
  "Mean confidence interval for Stellar returns (95%):",
  "[",
  round(stellar_ret_mean - stellar_ret_mean_error, 8),
  ";",
  round(stellar_ret_mean + stellar_ret_mean_error, 8),
  "]"
))

```

```
[1] "Mean confidence interval for Stellar returns (95%): [ -0.00134901 ; 0.00669388 ]"
```

```

print(paste(
  "Mean confidence interval for XRP returns (95%):",
  "[",
  round(xrp_ret_mean - xrp_ret_mean_error, 8),
  ";",
  round(xrp_ret_mean + xrp_ret_mean_error, 8),
  "]"
))

```

```
[1] "Mean confidence interval for XRP returns (95%): [ -0.00132127 ; 0.00561064 ]"
```

#Student - 90%

```

dogecoin_ret_mean = mean(df_dogecoin_ret$return)
stellar_ret_mean = mean(df_stellar_ret$return)
xrp_ret_mean = mean(df_xrp_ret$return)

dogecoin_ret_mean_error = student_error(df_dogecoin_ret$return, 0.05)
stellar_ret_mean_error = student_error(df_stellar_ret$return, 0.05)
xrp_ret_mean_error = student_error(df_xrp_ret$return, 0.05)

print(paste(
  "Mean confidence interval for Dogecoin returns (90%):",
  "[",
  round(dogecoin_ret_mean - dogecoin_ret_mean_error, 8),
  ";",
  round(dogecoin_ret_mean + dogecoin_ret_mean_error, 8),
  "]"
))

```

```
[1] "Mean confidence interval for Dogecoin returns (90%): [ -0.00205204 ; 0.00428142 ]"
```

```
print(paste(
  "Mean confidence interval for Stellar returns (90%):",
  "[",
  round(stellar_ret_mean - stellar_ret_mean_error, 8),
  ";",
  round(stellar_ret_mean + stellar_ret_mean_error, 8),
  "]"
))
```

```
[1] "Mean confidence interval for Stellar returns (90%): [ -0.00070186 ; 0.00604673 ]"
```

```
print(paste(
  "Mean confidence interval for XRP returns (90%):",
  "[",
  round(xrp_ret_mean - xrp_ret_mean_error, 8),
  ";",
  round(xrp_ret_mean + xrp_ret_mean_error, 8),
  "]"
))
```

```
[1] "Mean confidence interval for XRP returns (90%): [ -0.00076361 ; 0.00505298 ]"
```

#Student - 99%

```
dogecoin_ret_mean = mean(df_dogecoin_ret$return)
stellar_ret_mean = mean(df_stellar_ret$return)
xrp_ret_mean = mean(df_xrp_ret$return)

dogecoin_ret_mean_error = student_error(df_dogecoin_ret$return, 0.005)
stellar_ret_mean_error = student_error(df_stellar_ret$return, 0.005)
xrp_ret_mean_error = student_error(df_xrp_ret$return, 0.005)

print(paste(
  "Mean confidence interval for Dogecoin returns (99%):",
  "[",
  round(dogecoin_ret_mean - dogecoin_ret_mean_error, 8),
  ";",
  round(dogecoin_ret_mean + dogecoin_ret_mean_error, 8),
  "]"
))
```

```

    round(dogecoin_ret_mean + dogecoin_ret_mean_error, 8),
    "]"
))

```

```
[1] "Mean confidence interval for Dogecoin returns (99%): [ -0.00384709 ; 0.00607646 ]"
```

```

print(paste(
  "Mean confidence interval for Stellar returns (99%):",
  "[",
  round(stellar_ret_mean - stellar_ret_mean_error, 8),
  ";",
  round(stellar_ret_mean + stellar_ret_mean_error, 8),
  "]"
))

```

```
[1] "Mean confidence interval for Stellar returns (99%): [ -0.00261498 ; 0.00795986 ]"
```

```

print(paste(
  "Mean confidence interval for XRP returns (99%):",
  "[",
  round(xrp_ret_mean - xrp_ret_mean_error, 8),
  ";",
  round(xrp_ret_mean + xrp_ret_mean_error, 8),
  "]"
))

```

```
[1] "Mean confidence interval for XRP returns (99%): [ -0.002412 ; 0.00670137 ]"
```