

Pergunta 1

- Código em R:

```
1 install.packages("ggplot2")
2 library(ggplot2)
3
4 # Ler dados do ficheiro Países_PIB_ICH.csv
5 dados <- read.csv("https://web.tecnico.ulisboa.pt/~paulo.soares/pe/projeto/Paises_PIB_ICH.csv")
6
7 # Países a identificar
8 continentes <- c("Europe", "Americas")
9 tag <- c("Lithuania", "Iceland", "United States", "Saint Lucia")
10
11 # Data frame para as setas
12 dados$label_x <- ifelse(dados$Country %in% tag, dados$GDP * 0.99, NA)
13 dados$label_y <- ifelse(dados$Country %in% tag, dados$HCI * 0.99, NA)
14
15 # Gráfico
16 dados |>
17   subset(Continent %in% continentes) |>
18   ggplot() +
19     geom_point(aes(x = GDP, y = HCI, color = Continent)) +
20     scale_x_log10() +
21     geom_text(aes(x = GDP, y = HCI, label = ifelse(Country %in% tag, as.character(Country), '')),
22               hjust = 0.5, vjust = 2.7) +
23     geom_segment(aes(x = label_x, y = label_y - 0.01, xend = GDP, yend = HCI),
24                 arrow = arrow(length = unit(0.2, "cm")), color = "black", na.rm = TRUE) +
25     labs(title = paste("HCI as a function of GDP per Capita"),
26          x = "GDP per Capita (log scale)",
27          y = "Human Capital Index (values between 0 and 1)") +
28     theme(
29       plot.title = element_text(hjust = 0.5, face = "bold"),
30       axis.title.x = element_text(face = "bold"), axis.title.y = element_text(face = "bold"),
31       legend.title = element_text(face = "bold")
32     )
33 )
```

- Gráfico produzido:

