Exercise 1

Ada and Isak

2/10/2022

R Markdown

```
library(ggplot2)
```

Problem A

Question 1

We first want to write an R function that generates samples from a exponential distribution with rate parameter λ. We know that the cumulative exponential distrobution takes the form

$$F(x;\lambda) = 1 - \lambda e^{-\lambda x}, \quad x \geq 0$$

Computing the inverse cumulative function exploiting the uniform distribution $U \sim Unif(0,1)$ we can get

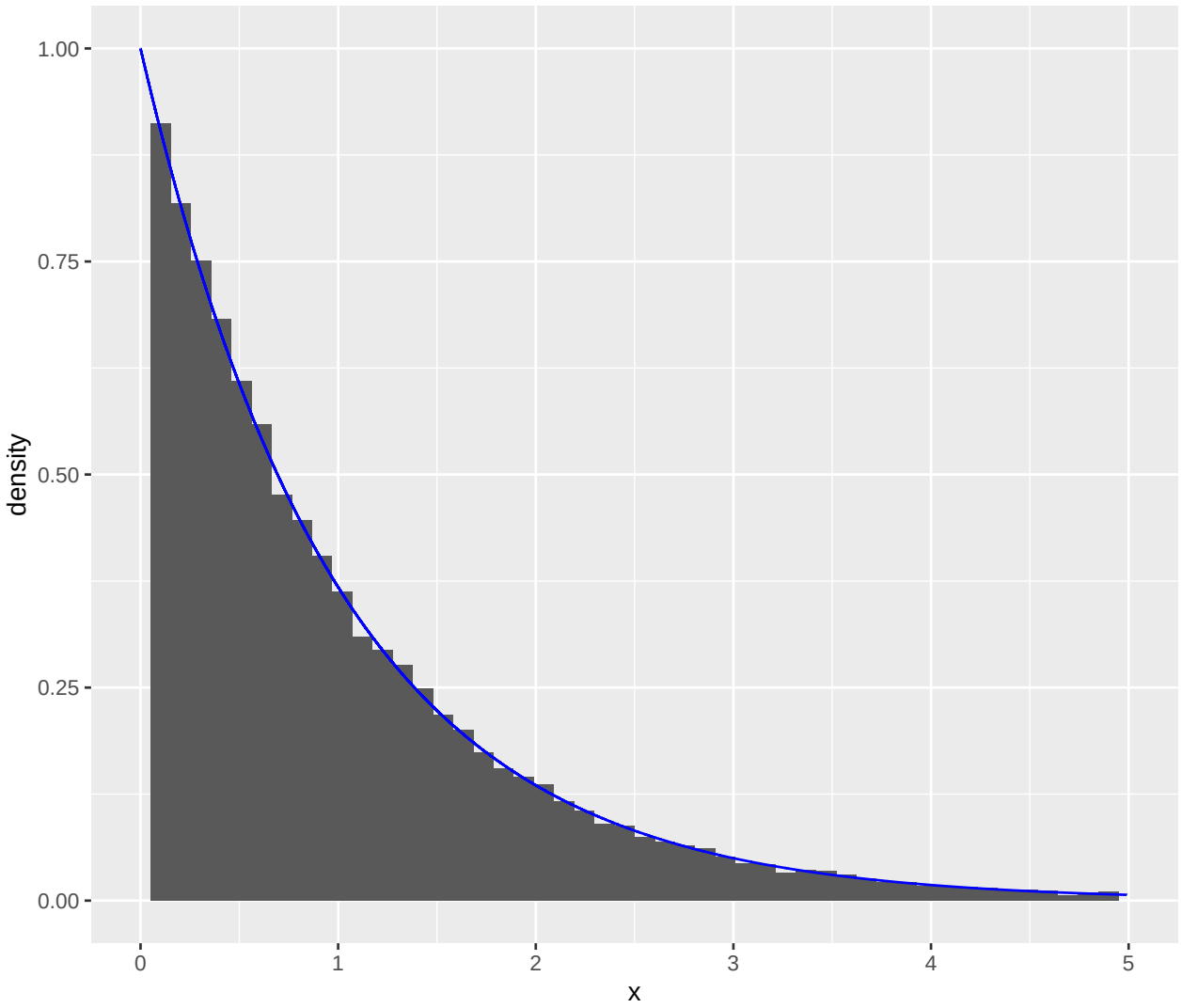
$$X = F^{-1}(u) = -ln(u)/\lambda, \quad 0 \leq u \leq 1$$

We now want to show that this is true using simulation from the inverse cumulative distribution

```
## Warning: Removed 414 rows containing non-finite values (stat_bin).
```

```
## Warning: Removed 2 rows containing missing values (geom_bar).
```

```
## Warning: Removed 414 row(s) containing missing values (geom_path).
```



From the plot one can see that the exponential distribtion that we generated and the exponential distribution in R closely follow each other, which means that our implementation is correct.