

# 01\_\_proc\_\_HPP

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4/15/2021

```
library(tidyverse)
library(ggplot2)
```

```
set.seed(1) # for reproducibility

t_max <- 10
t <- 0

lmbda <- 10

X <- numeric(0) # vector of t

while(t <= t_max){
  u <- runif(1)
  t <- t - log(u)/lmbda # t ~ exp(1/lambda)
  if(t < t_max) {
    X <- c(X,t) # update index
  }
}
```

```
length(X)
```

```
## [1] 114
```

```
df_HPP = tibble(
  x = X,
  y = 0:(length(X) - 1)
)

p_HPP <- ggplot(data=df_HPP, mapping=aes(x=x, y=y)) +
  geom_step() +
  labs(title = "Homogeneous Poisson Process (lambda = 10)",
       x = "t",
       y = "N(t)")
#p_HPP
```

```
# Plot time plot
df_HPP <- df_HPP %>% add_column(
  t_fix = rep(2, length(df_HPP$x))
)

p_HPP_time <- ggplot(data=df_HPP, mapping=aes(x=x, y=t_fix)) +
  geom_point(size=0.5) +
  ylim(c(1,3)) +
  labs(title = "Corresponding Inter-Arrival Times",
```

```

x = "t",
y = "y-axis has no meaning")
#p_HPP_time

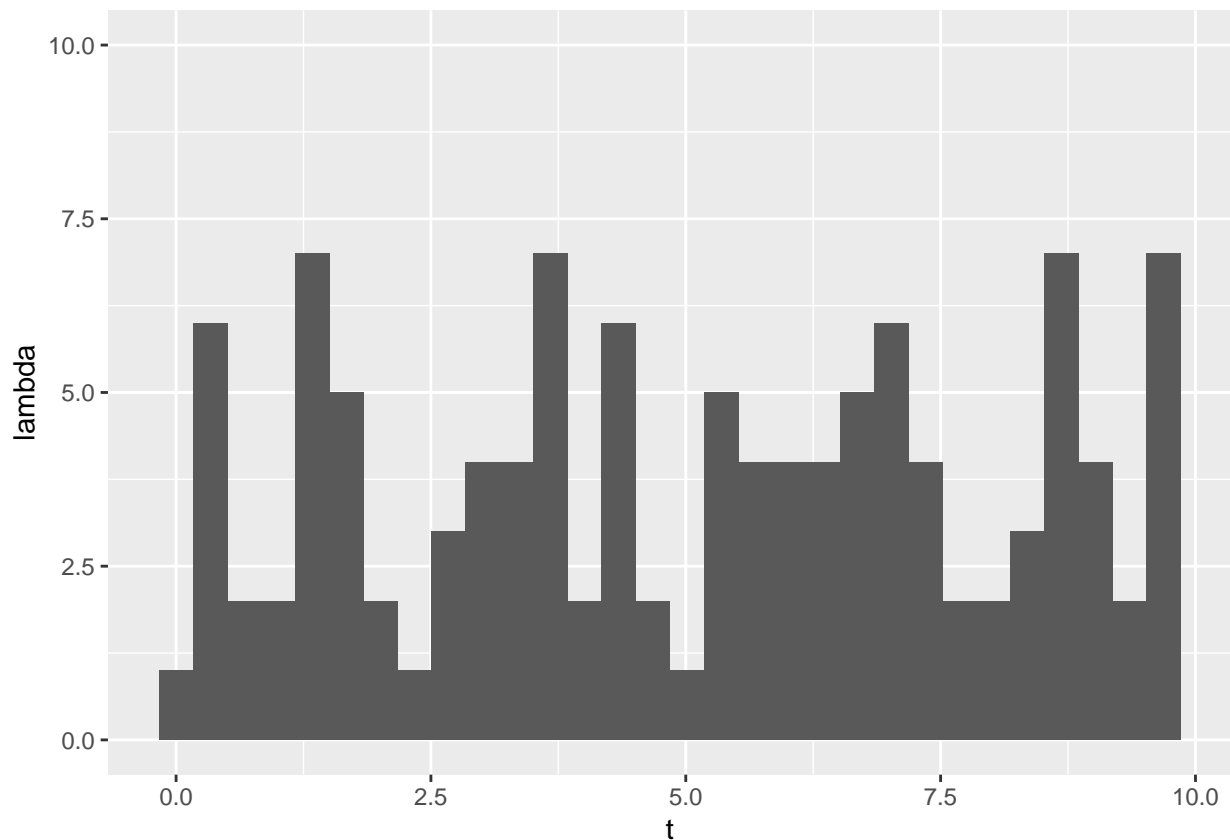
```

```

p_HPP_hist <- ggplot(data=df_HPP, mapping=aes(x=x)) +
  geom_histogram() +
  ylim(0, 10) +
  labs(x = "t",
       y = "lambda")
p_HPP_hist

```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



```
require(gridExtra)
```

```
## Loading required package: gridExtra
```

```
##
```

```
## Attaching package: 'gridExtra'
```

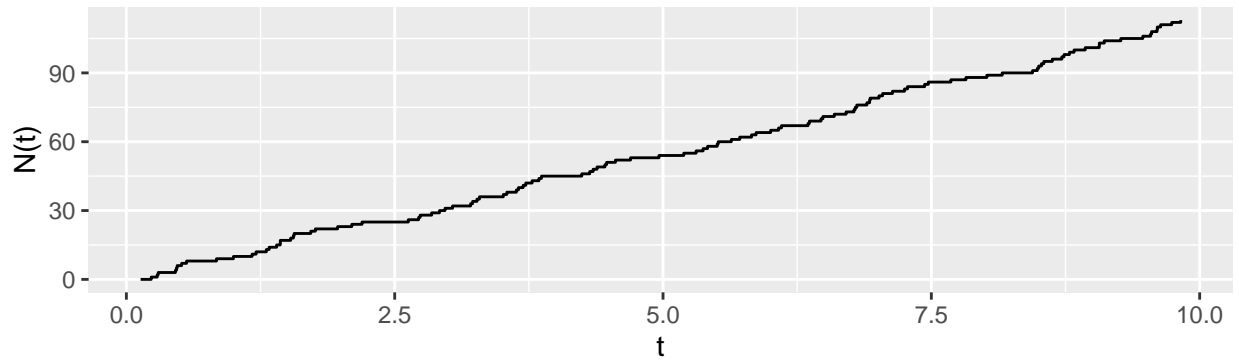
```
## The following object is masked from 'package:dplyr':
```

```
##
```

```
## combine
```

```
grid.arrange(p_HPP, p_HPP_time)
```

### Homogeneous Poisson Process ( $\lambda = 10$ )



### Corresponding Inter-Arrival Times

