

Part1.R

HP

2024-10-01

```
set.seed(143)
lambda <- 0.2
nexp <- 40

average <- NULL
for(i in 1:1000)
  average <- c(average, mean(rexp(nexp, lambda)))
lambda ^ -1
```

```
## [1] 5
```

```
mean(average)
```

```
## [1] 5.017549
```

```
(lambda * sqrt(nexp)) ^ -2
```

```
## [1] 0.625
```

```
var(average)
```

```
## [1] 0.6070057
```

```
library(ggplot2)
g <- ggplot(data.frame(column = average), aes(x = column))
g <- g + geom_histogram(aes(y = after_stat(density)), binwidth = 0.2, fill = 'pink', color = 'black')
g <- g + stat_function(fun = dnorm, args = list(mean = lambda^-1, sd=(lambda*sqrt(nexp))^-1), size=2)
```

```
## Warning: Using 'size' aesthetic for lines was deprecated in ggplot2 3.4.0.
## i Please use 'linewidth' instead.
## This warning is displayed once every 8 hours.
## Call 'lifecycle::last_lifecycle_warnings()' to see where this warning was
## generated.
```

```
g <- g + labs(title = "Distribution of Exponentials", x = "Simulation Means", y = "Density")
g
```

Distribution of Exponentials

