Amostrador de Gibbs

Distribuição normal bivariada

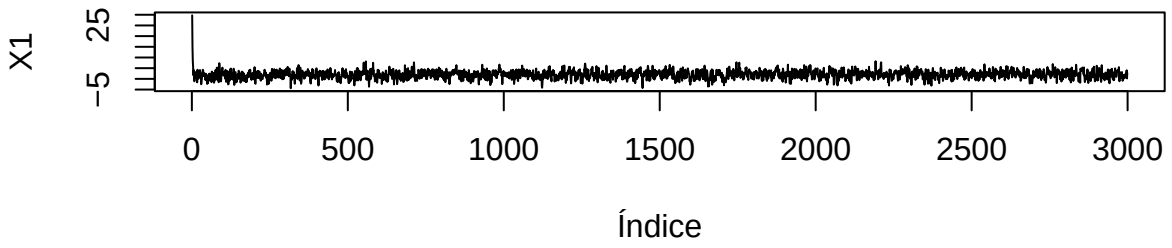
2023

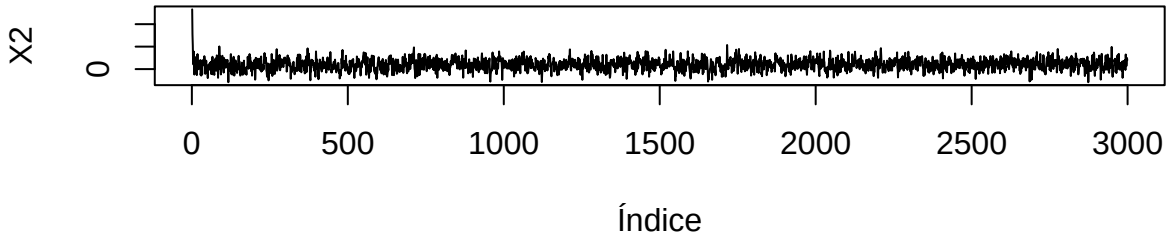
```r
## Médias, desvios padrão e covariância
mi1 <- 2
mi2 <- 1
sig1 <- sqrt(3)
sig2 <- 1
sig12 <- 0.8
```

```r
## Desvios padrão das distribuições condicionais completas
sigx1 <- sqrt(sig1^2 - sig12^2 / sig2^2)
sigx2 <- sqrt(sig2^2 - sig12^2 / sig1^2)
```

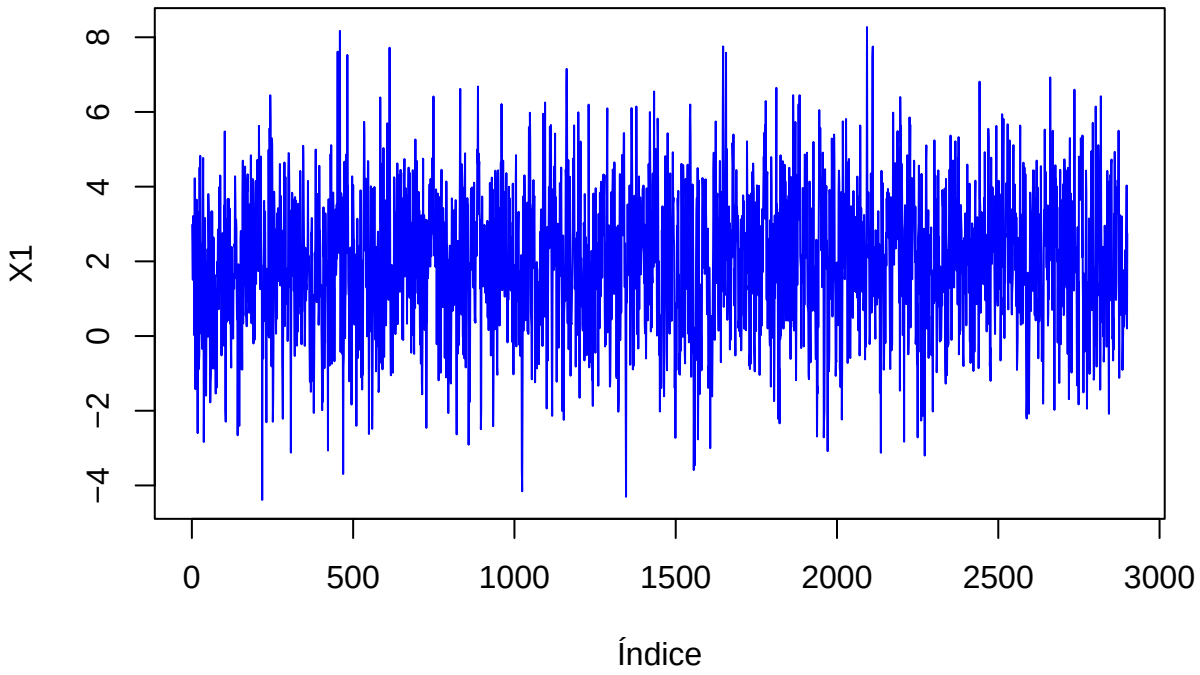
```r
## Amostrador
set.seed(91309)
R <- 3000
x1 <- x2 <- c()

# Valores iniciais
x1[1] <- 37
x2[1] <- 35

for (j in 2:R) {
  x1[j] <- rnorm(1, mi1 + sig12 * (x2[j - 1] - mi2) / sig2, sigx1)
  x2[j] <- rnorm(1, mi2 + sig12 * (x1[j] - mi1) / sig1, sigx2)
}
```

```r
## Gráficos
par(mfrow = c(2, 1))

plot(x1[-1], xlab = "Índice", ylab = "X1", type = "l")
plot(x2[-1], xlab = "Índice", ylab = "X2", type = "l")
```

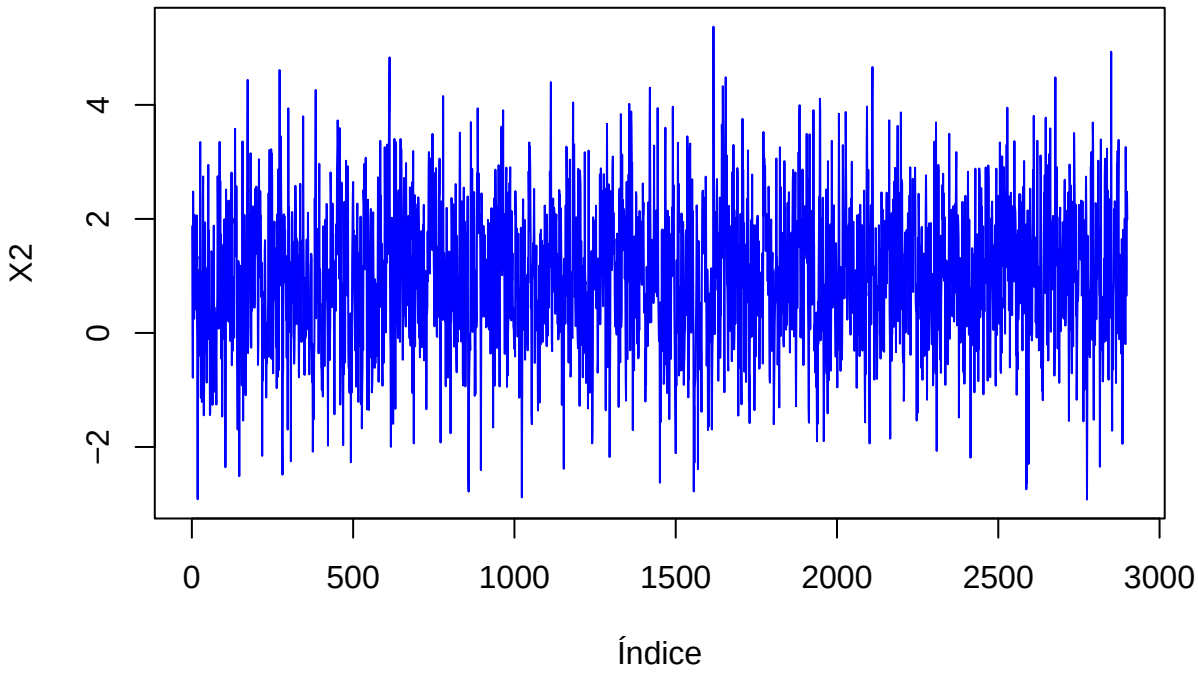




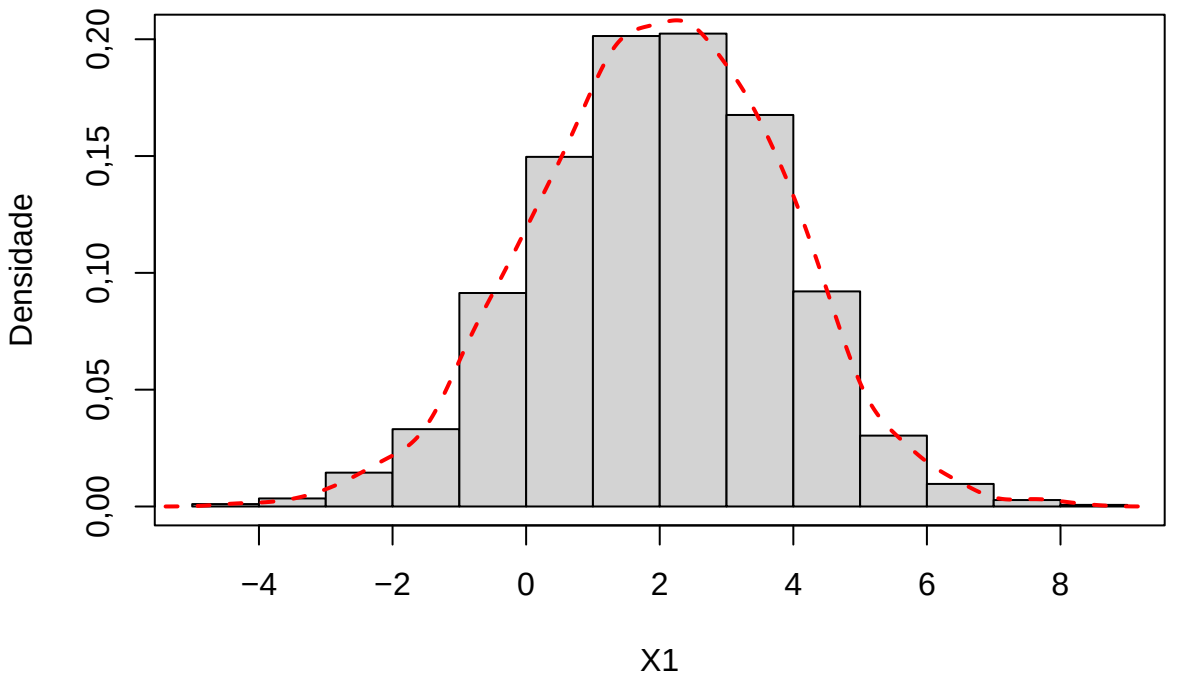

```
# Excluindo o início das sequências (burnin)
x1 <- x1[-(1:100)]
x2 <- x2[-(1:100)]

plot(x1, xlab = "Índice", ylab = "X1", type = "l", col = "blue")
```



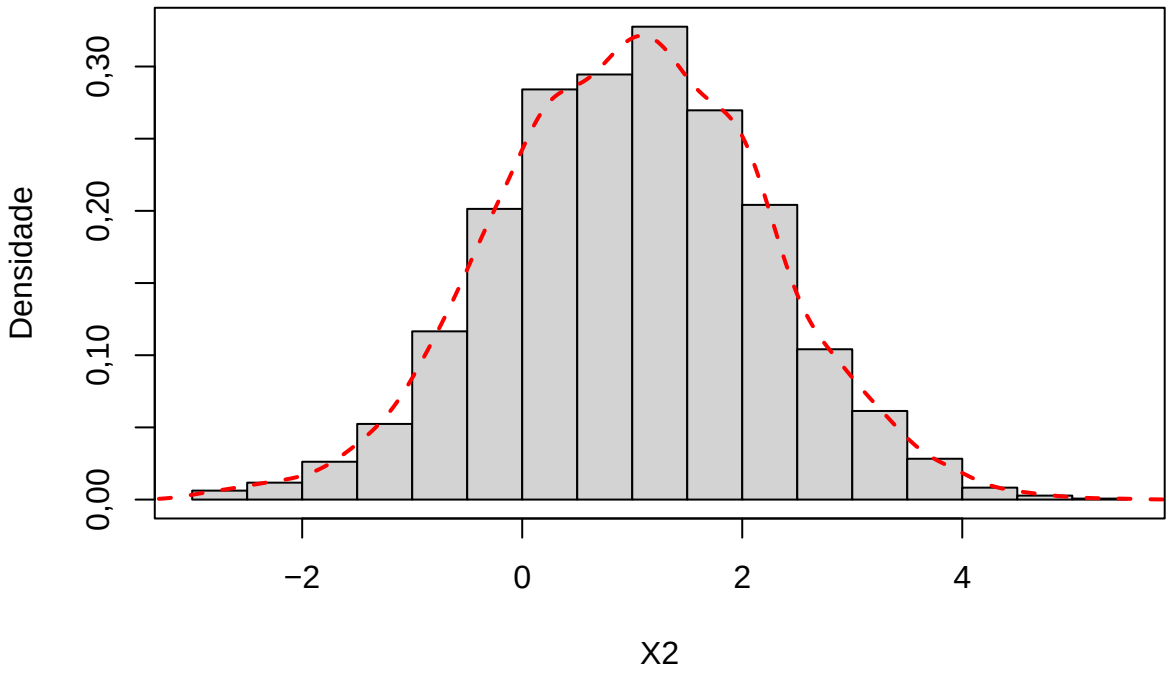

```
plot(x2, xlab = "Índice", ylab = "X2", type = "l", col = "blue")
```



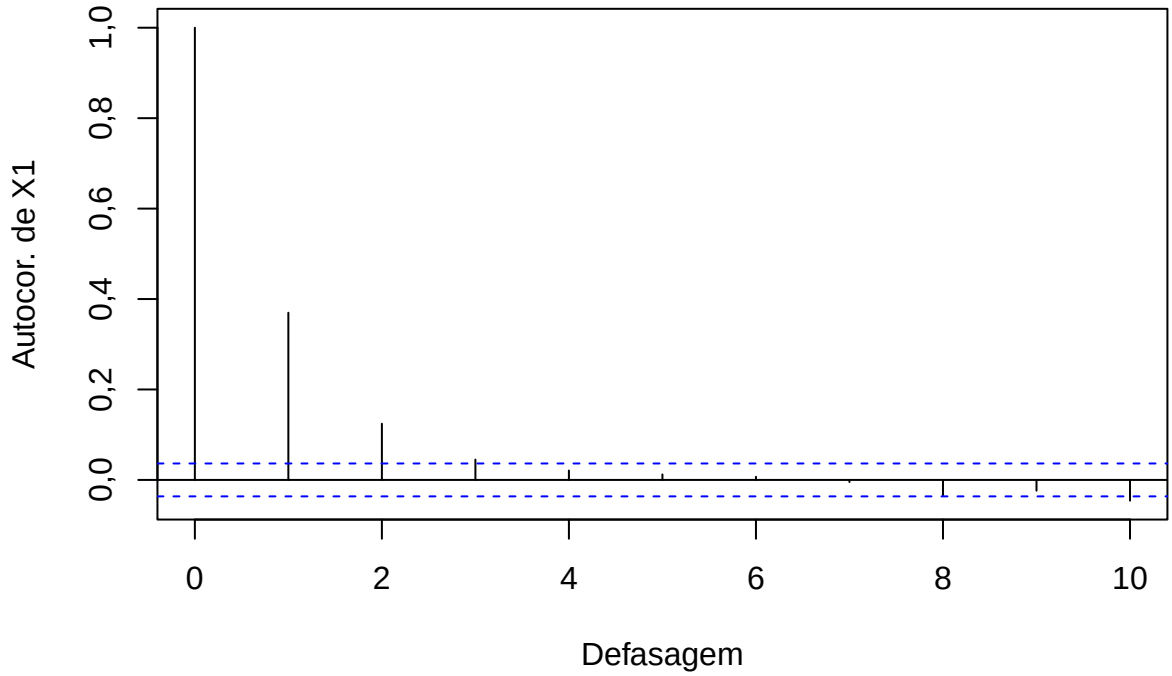

```
hist(x1, freq = FALSE, main = "", xlab = "X1", ylab = "Densidade" )
lines(density(x1), col = "red", lty = 2, lwd = 2)
box()
```



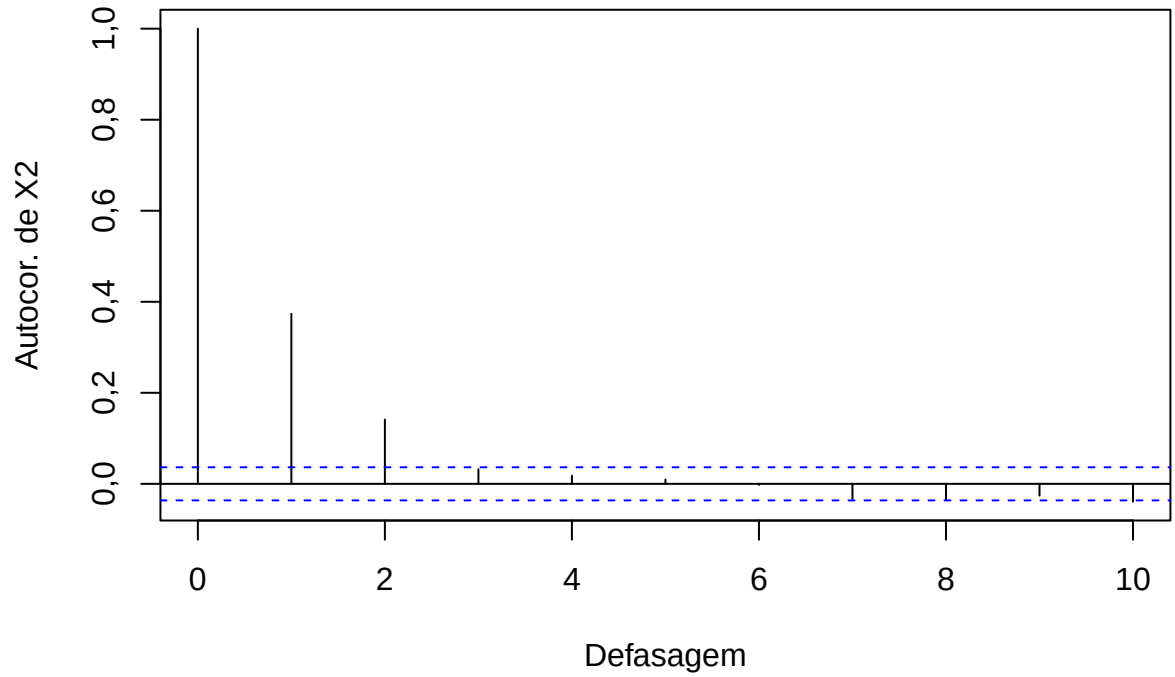

```
hist(x2, freq = FALSE, main = "", xlab = "X2", ylab = "Densidade" )
lines(density(x2), col = "red", lty = 2, lwd = 2)
box()
```



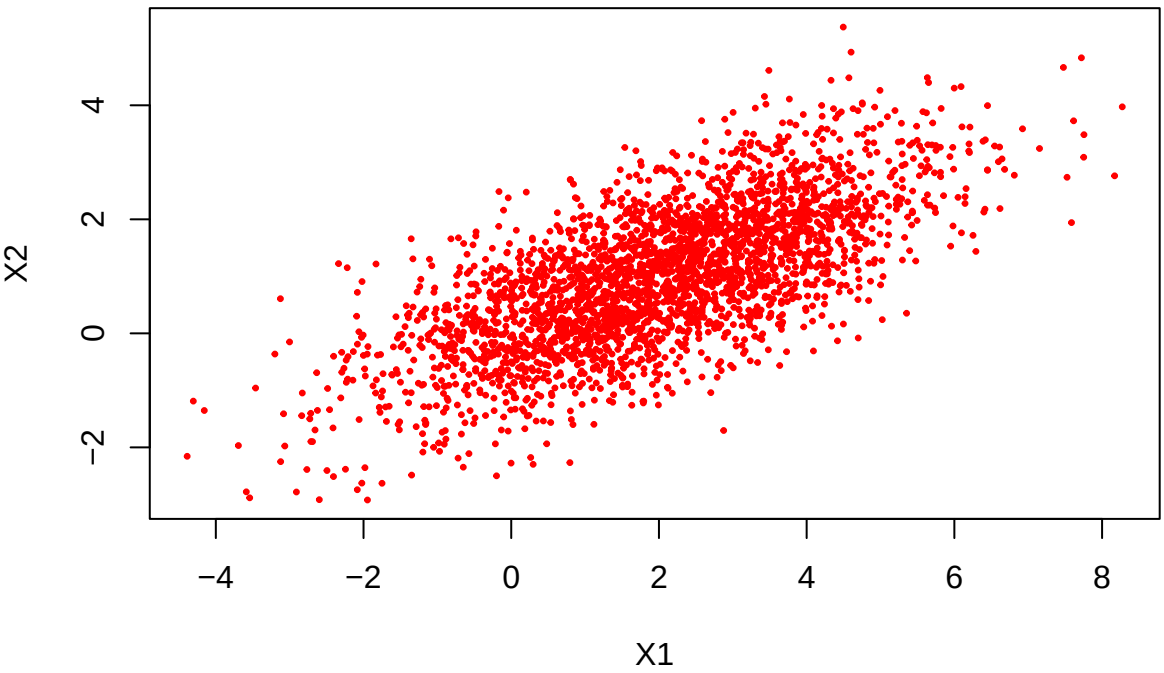

```
acf(x1, lag.max = 10, xlab = "Defasagem", main = "",
    ylab = "Autocor. de X1")
```




```
acf(x2, lag.max = 10, xlab = "Defasagem", main = "",
    ylab = "Autocor. de X2")
```




```
par(mfrow = c(1, 1))
plot(x1, x2, pch = 20, cex = 0.5, xlab = "X1", ylab = "X2", col = "red")
```



Observação. O amostrador de Gibbs não é o método mais eficiente para gerar amostras da distribuição normal bivariada.