

# Solução Lista 01

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(Não é preciso informar os RAs)

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## Exercício 01

```
A <- matrix(c(12, -1, -5, 0,  
             -1, 7, 2, -1,  
             -5, 2, 10, 1,  
             0, -1, 1, 3), nrow = 4, byrow = TRUE)  
  
b <- c(1, 2, 3, 4)  
x <- solve(A, b)  
print(x)
```

```
## [1] 0.1873874 0.4738739 0.1549550 1.4396396
```

## Exercício 02

```
its_positive <- function(A) {  
  n <- nrow(A)  
  for (i in 1:n) {  
    submatriz <- A[1:i, 1:i]  
    if (det(submatriz) <= 0) {  
      return(FALSE)  
    }  
  }  
  
  return(TRUE)  
  
  # Testing with matrix A from exercise 1  
A <- matrix(c(12, -1, -5, 0,  
             -1, 7, 2, -1,  
             -5, 2, 10, 1,  
             0, -1, 1, 3),  
            nrow = 4, byrow = TRUE)
```

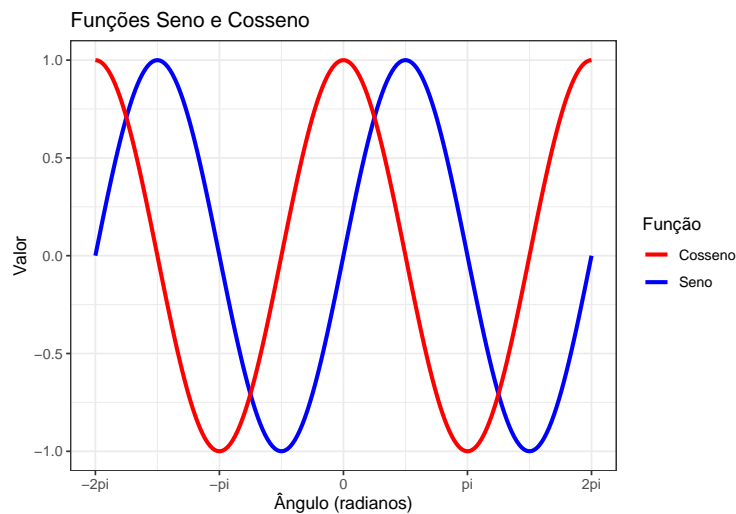
```
its_positive(A)
}
```

## Exercício 03

```
library(ggplot2)

dados <- data.frame(
  Angulo = seq(-2 * pi, 2 * pi, length.out = 200),
  Seno = sin(seq(-2 * pi, 2 * pi, length.out = 200)),
  Cosseno = cos(seq(-2 * pi, 2 * pi, length.out = 200))
)

ggplot(dados, aes(x = Angulo)) +
  geom_line(aes(y = Seno, color = "Seno"), linewidth = 1.2) +
  geom_line(aes(y = Cosseno, color = "Cosseno"), linewidth = 1.2) +
  scale_color_manual(values = c("Seno" = "blue", "Cosseno" = "red")) +
  labs(title = "Funções Seno e Cosseno", x = "Ângulo (radianos)", y = "Valor", color = "Função") +
  theme_bw() +
  scale_x_continuous(breaks = seq(-2*pi, 2*pi, pi), labels = c("-2pi", "-pi", "0", "pi", "2pi"))
```



## Exercício 04

```
library(ggplot2)

set.seed(1)
X <- matrix(runif(100, -1, 1), nrow = 10)
A <- t(X) %*% X

lambdas <- seq(0, 5, length.out = 100)
cond_numbers <- numeric(length(lambdas))
```

```

for (i in seq_along(lambdas)) {
  A_mod <- A + lambdas[i] * diag(10)
  cond_numbers[i] <- kappa(A_mod)
}

dados <- data.frame(Lambda = lambdas, CondNumber = cond_numbers)

ggplot(dados, aes(x = Lambda, y = CondNumber)) +
  geom_line() +
  labs(title = "Número de Condicionamento vs. Lambda", x = "Lambda", y = "Número de Condicionamento") +
  theme_bw() +
  scale_y_log10()

```

