

# moodle\_1\_05-06-21-31

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2022-06-05

```
library(knitr)      # For knitting document and include_graphics function
library(ggplot2)    # For plotting
library('png')
```

## pregunta 1

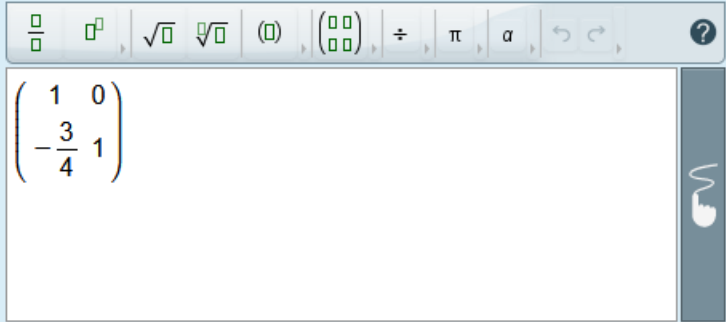
```
img1_path <- "p1_2022-06-05_213421.png"
include_graphics(img1_path)
```

Sea la matriz

$$A = \begin{pmatrix} -8 & a \\ 6 & b \end{pmatrix}$$

Usando la factorización LU de Doolittle (1's en la diagonal de L), cuál es la matriz L?

Respuesta:



The screenshot shows a Moodle question interface. At the top, it says "Sea la matriz" followed by the matrix  $A = \begin{pmatrix} -8 & a \\ 6 & b \end{pmatrix}$ . Below this, it asks: "Usando la factorización LU de Doolittle (1's en la diagonal de L), cuál es la matriz L?". The "Respuesta:" (Answer) field contains the matrix  $\begin{pmatrix} 1 & 0 \\ -\frac{3}{4} & 1 \end{pmatrix}$ . To the right of the answer field is a green checkmark, indicating the answer is correct. Above the answer field is a toolbar with various mathematical symbols like fractions, square roots, and matrices.

```
img1_path <- "cp1_2022-06-05_213514.png"
include_graphics(img1_path)
```

metodo doolittle(1's en la diagonal de L)

$$A = \begin{pmatrix} -8 & a \\ 6 & b \end{pmatrix} \text{ Definir}$$

$$L = \begin{pmatrix} 1 & 0 \\ x & 1 \end{pmatrix} \text{ Definir}$$

$$U = \begin{pmatrix} y & z \\ 0 & t \end{pmatrix} \text{ Definir}$$

$$L \cdot U = \begin{pmatrix} y & z \\ x \cdot y & t + x \cdot z \end{pmatrix} \text{ Calc}$$

$$y = -8 \text{ Definir}$$

$$z = a \text{ Definir}$$

$$x \cdot y = 6 \longrightarrow x = -\frac{3}{4} \text{ Solucionar}$$

$$x = -\frac{3}{4} \text{ Definir}$$

$$t + x \cdot z = b \xrightarrow{t} t = \frac{3}{4} \cdot a + b \text{ Solucionar}$$

$$t = \frac{3}{4} \cdot a + b \text{ Definir}$$

## pregunta 2

```
img1_path <- "p2_2022-06-05_213558.png"
include_graphics(img1_path)
```

Dado el sistema matricial  $A \cdot x = b$  con

$$A = \begin{pmatrix} -7 & 28 \\ 4 & -22 \end{pmatrix} \text{ y } b = \begin{pmatrix} 2 \\ -2 \end{pmatrix}$$

Haz la factorización  $LU$  de  $A$  por el método de Crout (1's en la diagonal de  $U$ ) y calcula  $L^{-1} \cdot b$

Respuesta:

$\frac{\square}{\square}$

$\square^{\square}$

$\sqrt{\square}$

$\sqrt[\square]{\square}$

$(\square)$

$\begin{pmatrix} \square & \square \\ \square & \square \end{pmatrix}$

$\div$

$\pi$


$\alpha$

$\leftarrow$

$\rightarrow$

?

$$\begin{pmatrix} -7 & 0 \\ 4 & -6 \end{pmatrix}^{-1} \cdot \begin{pmatrix} 2 \\ -2 \end{pmatrix}$$



La respuesta correcta es:  $\begin{pmatrix} -\frac{2}{7} \\ \frac{1}{7} \end{pmatrix}$

```
library('pracma')
vA <- c(-7,28,4,-22)
b <- c(2,-2)
n <- length(vA)/2
A <- matrix(vA,n,n,byrow=TRUE)
D <- lu_crout(A)
L <- D$L
U <- D$U
inv(L)%*%b
```

```
##           [,1]
## [1,] -0.2857143
## [2,]  0.1428571
```

### pregunta 3

```
img1_path <- "p3_2022-06-05_213712.png"
include_graphics(img1_path)
```

Dado el sistema de ecuaciones lineales:

$$\begin{pmatrix} -1 & -5 & 4 & -4 \\ -5 & 4 & 4 & -4 \\ 4 & 0 & -3 & 5 \\ 4 & -2 & -4 & -1 \end{pmatrix} \cdot \begin{pmatrix} x \\ y \\ z \\ t \end{pmatrix} = \begin{pmatrix} 4 \\ -4 \\ 0 \\ 3 \end{pmatrix}$$

Encuentra la tercera iteración  $x^3 = (x \ y \ z \ t)^T$  usando el método iterativo de Jacobi a partir de la solución inicial  $x = (0 \ 0 \ 0 \ 0)^T$ .

Respuesta:

$\frac{\square}{\square}$   $\square^\square$   $\sqrt{\square}$   $\sqrt[\square]{\square}$   $(\square)$   $\begin{pmatrix} \square & \square \\ \square & \square \end{pmatrix}$   $\div$   $\pi$   $\alpha$   $\leftarrow$   $\rightarrow$  ?

$\begin{pmatrix} 21.91667 \\ -15.31250 \\ -22.05556 \\ -26.16667 \end{pmatrix}$

La respuesta correcta es:

$$\begin{pmatrix} \frac{203}{3} \\ \frac{103}{12} \\ -11 \\ \frac{325}{3} \end{pmatrix}$$

```
library('pracma')
Am <- matrix(c(-1,-5,4,-4,-5,4,4,-4,4,0,-3,5,4,-2,-4,-1),4,4,byrow=TRUE)
b <- c(4,-4,0,3)

iter <- 3
## CAMBIA LA MATRIX Y EL VECTOR b !!!!! <-----!!!!

# D <- diag(diag(Am))
# L <- -tril(Am,-1)
# U <- -triu(Am,1)
# M <- D-L
# G <- inv(M)%*%U
# d <- inv(M)%*%b
#
# J <- inv(D)%*%(Lm+Um)
# c <- inv(D)%*%b
# c
```

```
# max(abs(eigen(G)$values))
x0 <- rep(0,length(diag(Am)))
x0
```

```
## [1] 0 0 0 0
```

```
sol_J = itersolve(Am, b, x0, nmax=iter,tol = 1e-6, method = "Jacobi")
# sol_G = itersolve(Am, b, x0, nmax=iter,tol = 1e-6, method = "Gauss-Seidel")
sol_J$x
```

```
## [1] 67.666667 8.583333 -11.000000 108.333333
```