moodle_1_05-06-21-03

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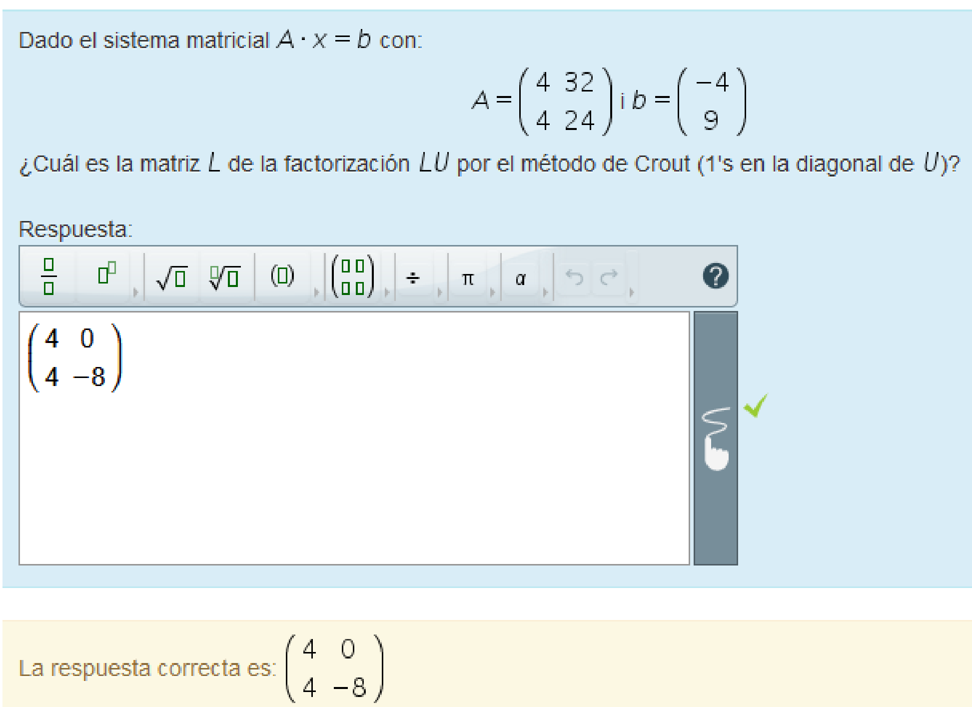
2022-06-05

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

pregunta 1

```r
img1_path <- "p1_2022-06-05_211126.png"
include_graphics(img1_path)
```

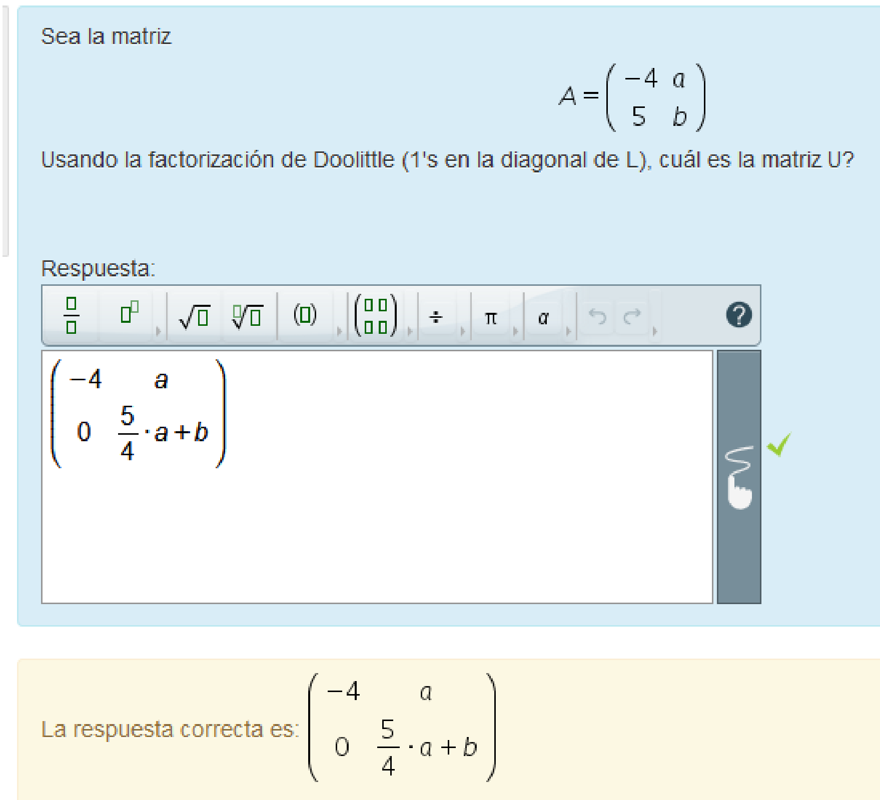



```r
library('pracma')
vA <- c(4,32,4,24)
n <- length(vA)/2
A <- matrix(vA,n,n,byrow=TRUE)
D <- lu_crout(A)
L <- D$L
U <- D$U
L
```

```
##      [,1] [,2]
## [1,]    4    0
## [2,]    4   -8
```

pregunta 2

```r
img1_path <- "p2_2022-06-05_211353.png"
include_graphics(img1_path)
```



Sea la matriz

$$A = \begin{pmatrix} -4 & a \\ 5 & b \end{pmatrix}$$

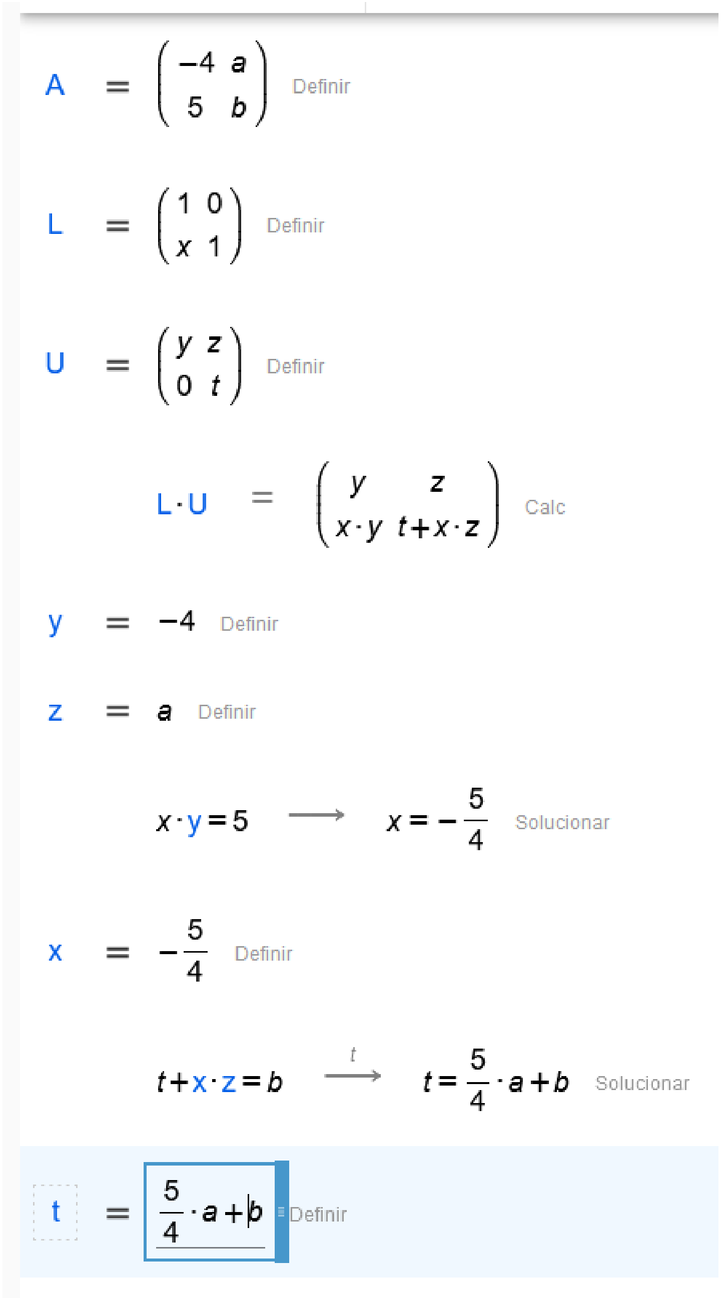
Usando la factorización de Doolittle (1's en la diagonal de L), cuál es la matriz U?

Respuesta:

$$\begin{pmatrix} -4 & a \\ 0 & \frac{5}{4} \cdot a + b \end{pmatrix}$$

La respuesta correcta es: $\begin{pmatrix} -4 & a \\ 0 & \frac{5}{4} \cdot a + b \end{pmatrix}$

```r
img1_path <- "cp2_2022-06-05_211446.png"
include_graphics(img1_path)
```



pregunta 3

```r
img1_path <- "cp3_2022-06-05_211808.png"
include_graphics(img1_path)
```

Dado el sistema de ecuaciones lineales:

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

Calcula la segunda iteración por Gauss-Seidel $x^2 = \underline{\begin{pmatrix} x & y & z & t \end{pmatrix}^T}$ partiendo de $x^0 = \underline{\begin{pmatrix} 0 & 0 & 0 & 0 \end{pmatrix}}$

Respuesta:

$$\begin{pmatrix} -50 \\ -179 \\ 497 \\ 93 \end{pmatrix}$$

✗

La respuesta correcta es: $\begin{pmatrix} -31 \\ -110 \\ 297 \\ 65 \end{pmatrix}$

```
Am <- matrix(c(-1,-4,-3,-2,2,-1,-4,1,-4,4,1,4,-1,-3,-1,-1),4,4,byrow=TRUE)

iter <- 2

b <- c(2,1,1,-1)
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)%*%(L+U)
c <- inv(D)%*%b
c
```

```
##      [,1]
## [1,]   -2
## [2,]   -1
## [3,]    1
## [4,]    1
```

```r
max(abs(eigen(G)$values))
```

```
## [1] 22.64675
```

```r
x0 <- rep(0,length(diag(Am)))
x0
```

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

```r
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_G$x
```

```
## [1]  -31 -110  297   65
```