moodle_1_05-06-12-22

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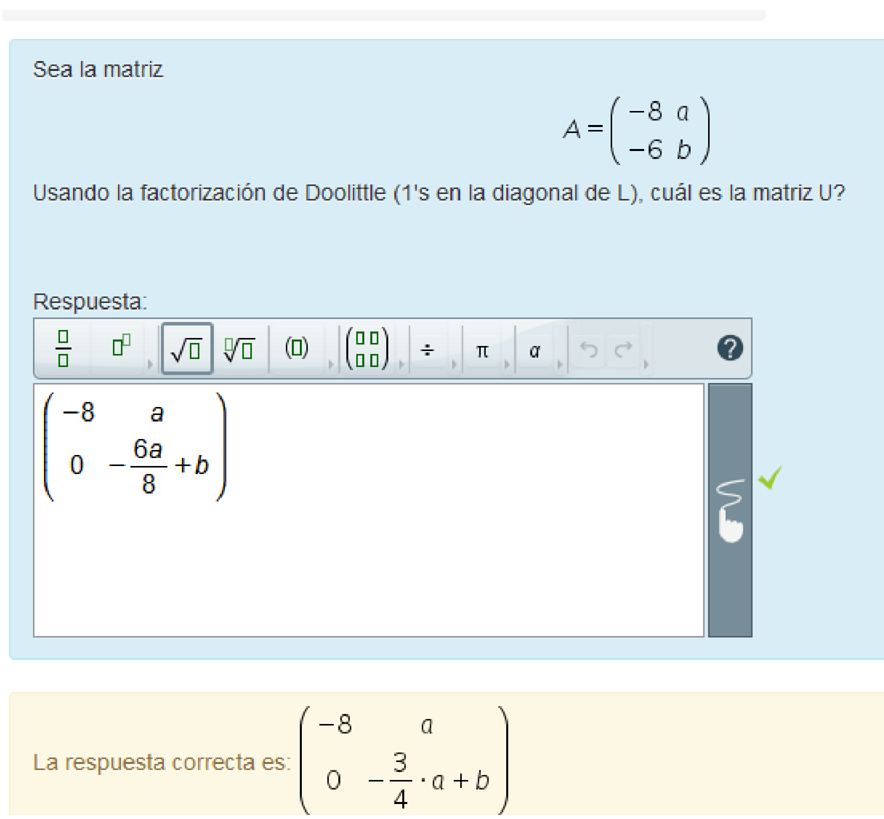
```r
library(knitr)      # For knitting document and include_graphics function
library(ggplot2)    # For plotting
library('png')
```

pregunta 1

```r
img1_path <- "p1_2022-06-05_122322.png"
include_graphics(img1_path)
```




```r
img1_path <- "calc1_2022-06-05_122722.png"
include_graphics(img1_path)
```

metodo doolittle

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

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

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

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

$$y = -8$$ Definir

$$z = a$$ Definir

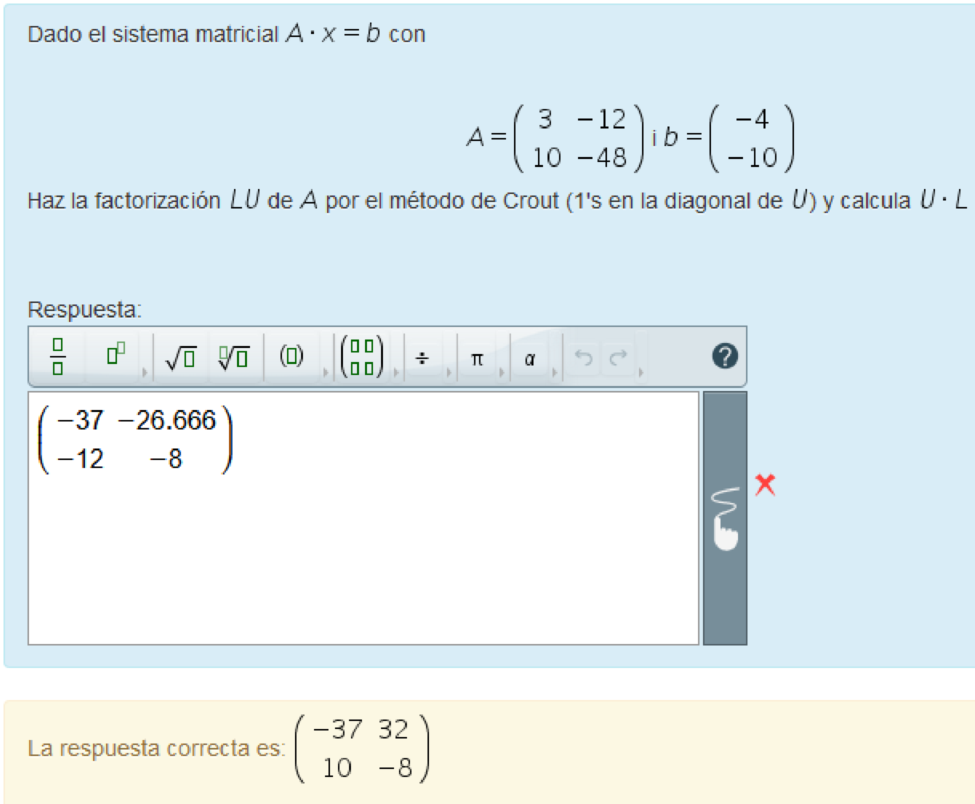
$$x \cdot y = -6 \longrightarrow x = \frac{3}{4}$$ Solucionar

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

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

pregunta 2

```
img1_path <- "p2_2022-06-05_123806.png"
include_graphics(img1_path)
```



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

$$A = \begin{pmatrix} 3 & -12 \\ 10 & -48 \end{pmatrix} \text{ i } b = \begin{pmatrix} -4 \\ -10 \end{pmatrix}$$

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

Respuesta:

$$\begin{pmatrix} -37 & -26.666 \\ -12 & -8 \end{pmatrix}$$

La respuesta correcta es: $\begin{pmatrix} -37 & 32 \\ 10 & -8 \end{pmatrix}$

```
library('pracma')
vA <- c(3,-12,10,-48)
n <- length(vA)/2
A <- matrix(vA,n,n,byrow=TRUE)
D <- lu_crout(A)
L <- D$L
U <- D$U
U%*%L
```

```
##      [,1] [,2]
## [1,]  -37   32
## [2,]   10   -8
```

pregunta 3

```
img1_path <- "p4_2022-06-05_123953.png"
include_graphics(img1_path)
```

Dado el sistema de ecuaciones lineales:

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

Calcula la tercera iteración por Gauss Seidel $x^3 = \begin{pmatrix} x & y & z & t \end{pmatrix}^T$ partiendo de $x^0 = \begin{pmatrix} 0 & 0 & 0 & 0 \end{pmatrix}$.

Respuesta:

$(-845 \ -2505 \ 4449 \ 24465)$

La respuesta correcta es: $\begin{pmatrix} -845 \\ -2505 \\ 4449 \\ 24465 \end{pmatrix}$

```
library('pracma')
Am <- matrix(c(1,4,4,1,1,-1,3,-4,-3,2,1,-4,1,-3,4,-1),4,4,byrow=TRUE)
b <- c(-3,2,-2,1)
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)%*%(Lm+Um)
# c <- inv(D)%*%b

# max(abs(eigen(G)$values))

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

# sol_J = itersolve(Am, b, x0, nmax=1,tol = 1e-6, method = "Jacobi")

sol_G = itersolve(Am, b, x0, nmax=3,tol = 1e-6, method = "Gauss-Seidel")
sol_G$x
```

```
## [1]  -845 -2505  4449 24465
```