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Math 4441

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<div align="center">Assignment 5</div>

1.

$$\begin{bmatrix} x_1 & -x_2 & 3x_3 & 2 \\ x_1 & x_2 & 0 & 4 \\ 3x_1 & -2x^2 & x_3 & 1 \end{bmatrix} \Rightarrow \begin{bmatrix} x_1 & -x_2 & 3x_3 & 2 \\ 0 & x_2 & -3x_3 & 2 \\ 0 & 0 & 13x_3 & 12 \end{bmatrix} \text{ Which gives}$$

$x_1 = 21/13$, $x_2 = 31/13$, and $x_1 = 12/13$

2.

Given the information, we can re-write the equation to be $LUx = Tb \Rightarrow x = L^{-1}U^{-1} * T * b$

Because $TA = LU$, $L^{-1}U^{-1} = T^{-1}A^{-1}$

$\Rightarrow x = L^{-1}U^{-1} * T * b$

$\Rightarrow x = L^{-1}U^{-1} * L_T U_T * b$

3.

```
function [] = crdout(A)

        %size of matrix
        n = length(A);

        %put first row of A into lower matrix
        L(:, 1) = A(:, 1);

        %put pivots of 1 into Upper matrix
        for i = 1:n
            U(i, i) = 1;
        end

        %scale upper matrix
        U(1,:) = A(1, :) / L(1, 1);
```

```matlab
    %iterate through rows
    for i = 2:n
     %
        for j = 2:i
            %assemble lower matrix
            L(i, j) = A(i, j) - L(i, 1:1:j - 1) * U(1:1:j - 1, j);
        end

        for j = i + 1:n
            %assemble upper matrix
            U(i, j) = (A(i, j) - L(i, 1:1:i - 1) * U(1:1:i - 1, j)) / L(i, i);
        end
    end

    L
    U

end
```