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Assignment 7

ELEN 3381
20250329

Solve (Hand Calculate) the following equations using Gaussian Elimination. Show your work. Verify your work with MATLAB. Submit your code and the result screenshot that shows values x, y, and z.

$2x + 3y + 5z - 38 = 0$
$7x + 11y + 13z - 101 = 0$
$17x + 19y + 29z - 235 = 0$

Please submit:

1. Hand calculation using Gaussian Elimination. (8 pts)

Augmented Matrix:

$$\begin{bmatrix} 2 & 3 & 5 & |38 \\ 7 & 11 & 13 & |101 \\ 17 & 19 & 29 & |235 \end{bmatrix}$$

$$R1 = \frac{1}{2}R1 \rightarrow \begin{bmatrix} 1 & 1.5 & 2.5 & |19 \\ 7 & 11 & 13 & |101 \\ 17 & 19 & 29 & |235 \end{bmatrix}$$

$$R2 = R2 - 7 * R1 \text{ and } R3 = R3 - 17 * R1 \rightarrow \begin{bmatrix} 1 & 1.5 & 2.5 & |19 \\ 0 & 0.5 & -4.5 & |-32 \\ 0 & -6.5 & -13.5 & |-88 \end{bmatrix}$$

$$R2 = 2 * R2 \text{ and } R3 = R3 + 6.5 * R2 \rightarrow \begin{bmatrix} 1 & 1.5 & 2.5 & |19 \\ 0 & 1 & -9 & |-64 \\ 0 & 0 & -72 & |504 \end{bmatrix}$$

Solve:

$$-72z = -504 \rightarrow z = \frac{504}{72} \rightarrow [z = 7]$$

$$y - 9 * 7 = -64 \rightarrow y = -64 + 63 \rightarrow [y = -1]$$

$$x + 1.5 * (-1) + 2.5 * 7 = 19 \rightarrow x = 19 - 17.5 + 1.5 \rightarrow x = 19 - 16 \rightarrow [x = 3]$$

2. Verify your answer with MATLAB. Submit your code and the screenshot that shows the result. (2 pts)

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%}

clc,clear;


A = [2 3 5;7 11 13;17 19 29];
b = [38; 101; 235];

solution = A\b;

x = solution(1);
y = solution(2);
z = solution(3);

fprintf(['x = %.2f\ny = %.2f\nz = %.2f\n'], x, y, z);
```

```
mmand Window
x = 3.00
y = -1.00
z = 7.00
>>
```