

MAC1140 SEC29 Quiz 10-22-2007 10.2 10.3

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1.

[10.2.1PT] Select the type of solution for the following system

$$\begin{cases} x - y + z = -4 \\ 2x - 3y + 4z = -15 \\ 4x - 5y + 6z = -23 \end{cases}$$

- Exactly three solutions
- No solution
- Unique solution
- Infinitely many solutions
- None of these

Handwritten work for Question 1:

$$\begin{cases} x - y + z = -4 \\ 0 - y + 2z = -7 \quad (R_2 - 2R_1) \\ 0 - y + 2z = -7 \quad (R_3 - 4R_1) \end{cases}$$

$R_2: 2x - 3y + 4z = -15$   
 $-2R_1: -2x + 2y - 2z = 8$   
 $\hline -y + 2z = -7$

$R_3: 4x - 5y + 6z = -23$   
 $-4R_1: -4x + 4y - 4z = 16$   
 $\hline -y + 2z = -7$

$0 = 0 \quad (R_3 - R_2)$   
*always true;*

$R_3: -y + 2z = -7$   
 $-R_2: y - 2z = 7$   
 $\hline 0 = 0$

So we essentially have two eqns for 3 variables.

2.

[10.3.2PT] Choose the type of solution for the linear system having the following augmented matrix

$$\left[ \begin{array}{ccc|c} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{array} \right]$$

- Exactly three solutions
- Unique solution
- Infinitely many solutions
- None of these
- No solution

Handwritten work for Question 2:

$$\begin{cases} x = 0 \\ y = 0 \\ z = 0 \end{cases}$$

↑  
called unique soln.  
one.

3.

[10.3.4aPT] Choose the correct x, y, or z value for the solution of the system

$$\begin{cases} 3x + 5y - z = -7 \\ x + y + z = -1 \\ 2x + 11z = 7 \end{cases}$$

- z = -1

Handwritten work for Question 3:

$$\begin{cases} x + y + z = -1 \quad R_2 \\ 3x + 5y - z = -7 \quad R_1 \\ 2x + 11z = 7 \end{cases}$$

$R_2: 3x + 5y - z = -7$   
 $-3R_1: -3x - 3y - 3z = 3$   
 $\hline 2y - 4z = -4$

$R_3: 2x + 11z = 7$   
 $-2R_1: -2x - 2y - 2z = 2$   
 $\hline -2y + 9z = 9$

$x = -2$

$y = 2$

$y = -1$

$z = -2$

$$\begin{cases} x + y + z = -1 \\ 2y - 4z = -4 \\ 5z = 5 \quad (R_2 + R_3) \end{cases}$$

$$\begin{array}{l} R_3 \quad -2y + 4z = 9 \\ R_2 \quad 2y - 4z = -4 \\ \hline 5z = 5 \end{array}$$

Plug  $z=1$  to  $R_2$   
 $y=0$

$$\begin{cases} x = -2 \\ y = 0 \\ z = 1 \end{cases}$$

Plug  $z=1, y=0$  to  $R_1$

4.

[10.3.5aPT] Select the matrix obtained by applying the row operation

$R_3 = 3R_2 + R_3$  to

$\begin{bmatrix} 1 & 1 & 1 & 6 \\ 0 & 1 & 1 & -6 \\ 0 & -3 & -3 & -9 \end{bmatrix}$

$$\begin{array}{l} 3R_2 \quad 0 \quad 3 \quad 3 \quad -18 \\ R_3 \quad 0 \quad -3 \quad -3 \quad -9 \\ \hline 0 \quad 0 \quad 0 \quad -27 \end{array}$$

replace

$\begin{bmatrix} 1 & 0 & 0 & 12 \\ 0 & 1 & 1 & -6 \\ 0 & -3 & -3 & -9 \end{bmatrix}$

$\begin{bmatrix} 1 & 1 & 1 & 6 \\ 0 & 1 & 1 & -6 \\ 0 & 0 & -2 & -15 \end{bmatrix}$

$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & -6 \\ 0 & -3 & -3 & -9 \end{bmatrix}$

$\begin{bmatrix} 1 & 1 & 1 & 6 \\ 0 & 1 & 1 & -6 \\ 0 & 0 & 0 & -27 \end{bmatrix}$