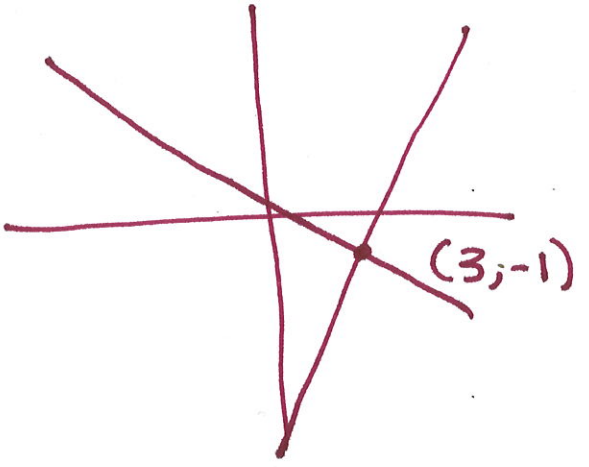
MTH 161
Quiz #8
December 6, 2018

Name KEY graphing

Solve the following systems of equations.

1. $3x - y = 10$ → $3x - 10 = y$
   $2x + 5y = 1$ → $y = \frac{1-2x}{5}$



2. $\begin{cases} x - 2y + 3z = 7 \\ 2x + y + z = 4 \\ -3x + 2y - 2z = -10 \end{cases}$

See attached graph

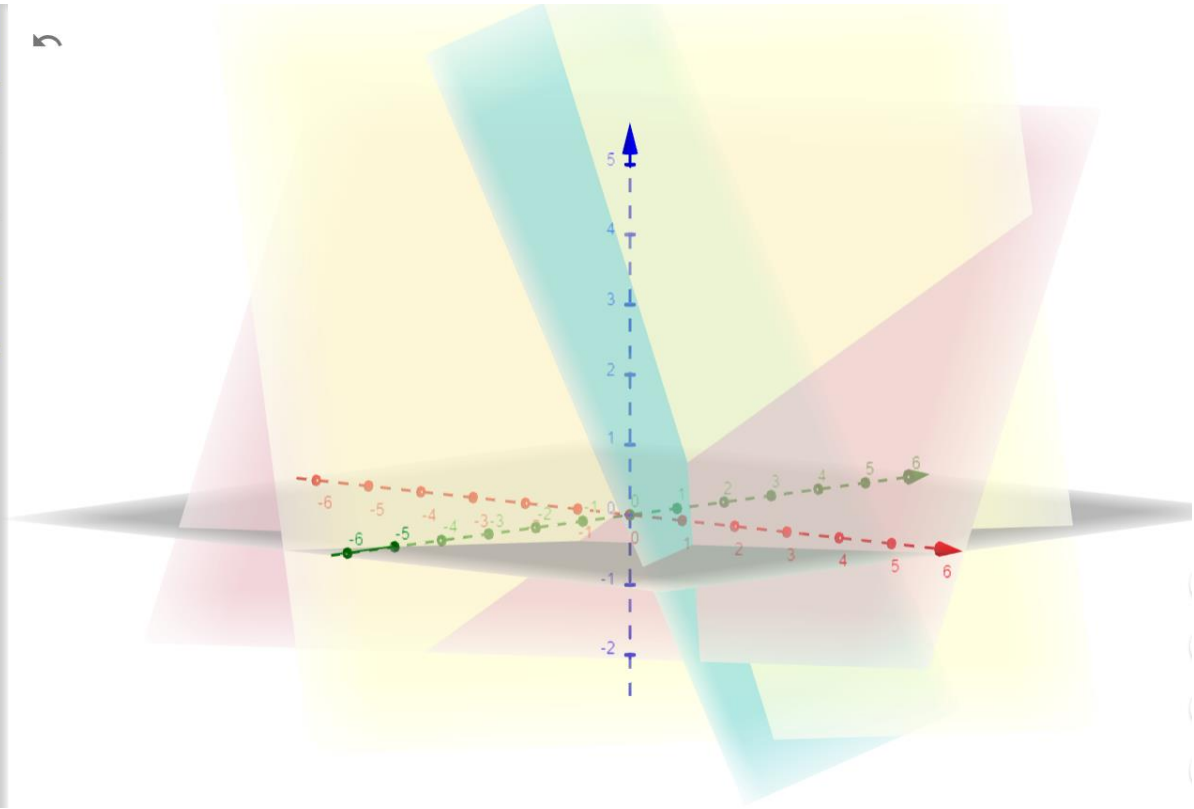
intersection (2, -1, 1)

a : $x - 2y + 3z = 7$

c : $2x + y + z = 4$

b : $-3x + 2y - 2z = -10$

Input...



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Name KEY elimination

Solve the following systems of equations.

1. $3x - y = 10$
   $2x + 5y = 1$

$*5$

$15x - 5y = 50$
$2x + 5y = 1$
$17x = 51$
$x = 3$

$3(3) - y = 10$
$9 - y = 10$
$-y = 1$
$\rightarrow y = -1$

$(3, -1)$

2. $\begin{cases} x - 2y + 3z = 7 \\ 2x + y + z = 4 \\ -3x + 2y - 2z = -10 \end{cases}$

$*-2$ $-2x + 4y - 6z = -14$
$2x + y + z = 4$
$5y - 5z = -10$

$*3$ $3x - 6y + 9z = 21$
$-3x + 2y - 2z = -10$
$-4y + 7z = 11$

$5y - 5z = -10 \div 5$
$y - z = -2 \quad *4$
$-4y + 7z = 11$

$4y - 4z = -8$
$-4y + 7z = 11$
$3z = 3$
$z = 1$

$y - 1 = -2$
$y = -1$

$x - 2(-1) + 3(1) = 7$
$x + 2 + 3 = 7$
$x + 5 = 7$
$x = 2$

$(2, -1, 1)$

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Name KEY substitution

Solve the following systems of equations.

1. $\begin{aligned} 3x - y &= 10 \\ 2x + 5y &= 1 \end{aligned}$ → $y = 3x - 10$

$2x + 5(3x - 10) = 1$

$2x + 15x - 50 = 1$

$17x = 51$

$x = 3$

$(3, -1)$

$y = 3(3) - 10 = 9 - 10 = -1$

2. $\begin{cases} x - 2y + 3z = 7 \\ 2x + y + z = 4 \\ -3x + 2y - 2z = -10 \end{cases}$ → $x = 2y - 3z + 7$

$2(2y - 3z + 7) + y + z = 4$

$4y - 6z + 14 + y + z = 4$

$5y - 5z = -10$

$y - z = -2$

$-3(2y - 3z + 7) + 2y - 2z = -10$

$-6y + 9z - 21 + 2y - 2z = -10$

$-4y + 7z = 11$

$y = z - 2$

$-4(z - 2) + 7z = 11$

$-4z + 8 + 7z = 11 \rightarrow 3z = 3 \rightarrow z = 1$

$y = 1 - 2 = -1$

$x = 2(-1) - 3(1) + 7$

$= -2 - 3 + 7$

$= 2$

$(2, -1, 1)$

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Name KEY matrices

Solve the following systems of equations.

1. $3x - y = 10$
   $2x + 5y = 1$

$$\left[\begin{array}{cc|c} 3 & -1 & 10 \\ 2 & 5 & 1 \end{array}\right] \quad \tfrac{1}{3}R_1 \to R_1$$

$$\left[\begin{array}{cc|c} 1 & -1/3 & 10/3 \\ 2 & 5 & 1 \end{array}\right] \quad -2R_1 + R_2 \to R_2$$

$$\begin{array}{ccc} -2 & 2/3 & -20/3 \\ 2 & 5 & 1 \\ \hline 0 & 17/3 & -17/3 \end{array}$$

$$\left[\begin{array}{cc|c} 1 & -1/3 & 10/3 \\ 0 & 17/3 & -17/3 \end{array}\right] \quad \frac{3}{17}\left(\frac{17}{3}y = -\frac{17}{3}\right)\frac{3}{17}$$

$y = -1$

$(3, -1)$

$$x - \tfrac{1}{3}(-1) = 10/3 \to x + \tfrac{1}{3} = 10/3 \to x = 9/3 = 3$$

2. $\begin{cases} x - 2y + 3z = 7 \\ 2x + y + z = 4 \\ -3x + 2y - 2z = -10 \end{cases}$

$$\left[\begin{array}{ccc|c} 1 & -2 & 3 & 7 \\ 2 & 1 & 1 & 4 \\ -3 & 2 & -2 & -10 \end{array}\right] \qquad \begin{array}{cccc} -2 & 4 & -6 & -14 \\ 3 & -6 & 9 & 21 \end{array}$$

$-2R_1 + R_2 \to R_2$
$3R_1 + R_3 \to R_3$

$$\left[\begin{array}{ccc|c} 1 & -2 & 3 & 7 \\ 0 & 5 & -5 & -10 \\ 0 & -4 & 7 & 11 \end{array}\right]$$

$\frac{1}{5}R_2 \to R_2$

$$\left[\begin{array}{ccc|c} 1 & -2 & 3 & 7 \\ 0 & 1 & -1 & -2 \\ 0 & -4 & 7 & 11 \end{array}\right] \qquad 0 \quad 4 \quad -4 \quad -8$$

$4R_2 + R_3 \to R_3$

$$\left[\begin{array}{ccc|c} 1 & -2 & 3 & 7 \\ 0 & 1 & -1 & -2 \\ 0 & 0 & 3 & 3 \end{array}\right]$$

$3z = 3$
$z = 1$

$(2, -1, 1)$

$y - z = -2$
$y - 1 = -2$
$y = -1$

$x - 2(-1) + 3(1) = 7$
$x + 5 = 7$
$x = 2$