Derek Haynes
Math 303
Week 1 Discussions

Will Marlowe
Aug 26, 2019

To solve this problem we can take the two given equations and form an augmented matrix. Then, by using elementary row operations we can solve for the values of $x_1 \, and \, x_2$ that will satisfy both equations (assuming such values exist) and therefore be the point where the two lines intersect on an x_1-x_2 plane.

Reply

John Moore
Aug 26, 2019

The matrix form would be

$$\begin{bmatrix} 1 & -5 & 1 \\ 3 & -7 & 5 \end{bmatrix}$$

Reply

Derek Haynes
Aug 27, 2019

Solution:

Step 1. Multiply row 1 by -3 and add the row to row 2 to obtain a new equation 3 aug. matrix

$$\begin{pmatrix} 1 & -5 & 1 \\ 0 & 8 & 2 \end{pmatrix}$$

Step 2. Multiply eqn 2 by 1/8

$$\begin{pmatrix} 1 & -5 & 1 \\ 0 & 1 & 1/4 \end{pmatrix}$$

Step 3. Multiply row 2 by 5 and add to row 1

$$\begin{pmatrix} 1 & 0 & 9/4 \\ 0 & 1 & 1/4 \end{pmatrix}$$

Edited by Derek Haynes on Aug 27 at 11:45pm

Reply

Jacob Realey
Thursday

Keeping 3 as our pivot, the new augmented matrix would be $\begin{bmatrix} 3 & -4 & 2 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$. This matrix is in echelon form. (Steps: replacing R_2 with $3^*R_1+R_2$ and R_3 with $2^*R_1+R_3$)

I have calculated the reduced system of equations at this point. However, is it necessary to change this new matrix to its reduced echelon form? There is only one basic variable and the pivot '3' causes uneven division with possible rounding errors in the matrix.

Reply

Markus Pomper
Thursday

We will need to multiply row 1 by (1/3) in order to get the matrix into **reduced** row echelon form. Then we can solve the system by observing that x_2 and x_3 are free.

Reply

Derek Haynes
Thursday

I get:

$$\begin{bmatrix} 1 & 4/3 & 2/3 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

1. R1 - R2 Swap

2. 1/3R1 + R2 to replace row 2

3. -2/3 R1 + R3 to replace row 3

4. 1/9 R1

Reply

Derek Haynes

Friday

Extra practice: 1.2.12

$$\begin{bmatrix} 1 & -7 & 0 & 6 & 5 \\ 0 & 0 & 1 & -2 & -3 \\ -1 & 7 & -4 & 2 & 7 \end{bmatrix}$$

1. Add R1 to R3

2. Add 4*R2 to R3 to get the matrix in reduced echelon form

$$\begin{bmatrix} 1 & -7 & 0 & 6 & 5 \\ 0 & 0 & 1 & -2 & -3 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

3.

$$\begin{aligned} x_1 - 7x_2 + 6x_3 &= 5 \\ x_3 - 2x_4 &= -3 \end{aligned}$$

4. $\begin{cases} x_1 = 5 + 7x_2 + 6x_3 \\ x_2 = is free \\ x_3 = -3 + 2x_4 \\ x_4 = is free \end{cases}$

Edited by Derek Haynes on Aug 30 at 11:37pm

View in discussion

Elijah Twibell

10:31pm

Hi Mostafa,

I believe for part b, the two vectors should be $\begin{bmatrix} -2 \\ 5 \end{bmatrix}$ and $\begin{bmatrix} -5 \\ 2 \end{bmatrix}$.

However, I'm unsure as to what that question is actually asking.

But I would like to take a stab at **part c**. I believe this is True, because you could also write the linear combination of those two vectors as $\frac{1}{2}v_1 + 0v_2$. The book says that the weights of the linear combination can be any real numbers, and that includes zero.

Reply

Derek Haynes

10:35pm

For part B. The Answer is false. In order for **v** to be in the same span as **u**, v would have to be some constant multiple of u and vice versa.

$v = \begin{bmatrix} -2 \\ 5 \end{bmatrix} u = \begin{bmatrix} -5 \\ 2 \end{bmatrix} c = scalar$

-2c = -5 and 5c =2

is impossible

Edited by Derek Haynes on Sep 4 at 10:39pm

Reply

Derek Haynes

10:45pm

c. The answer is True

The linear combo of $v_1 and v_2$ is the vector $\frac{1}{2}v_1$ when:

$c_1v_1 + c_2v_2 = \frac{1}{2}v_1$ and $c_1 = \frac{1}{2}$ and $c_2 = 0$.

Reply

Markus Pomper

Aug 26, 2019

Determine the point of intersection of the two lines given by $x_1 - 5x_2 = 1$and $3x_1 - 7x_2 = 5$.

In order to spread the wealth, only propose how to go about solving the problem. Someone else will take it from there.

Reply

Will Marlowe

Aug 26, 2019

To solve this problem we can take the two given equations and form an augmented matrix. Then, by using elementary row operations we can solve for the values of $x_1 and\ x_2$ that will satisfy both equations (assuming such values exist) and therefore be the point where the two lines intersect on an x_1-x_2 plane.

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Derek Haynes
Aug 26, 2019

Hi everyone,

I'm Derek and I'm a Math major from Seattle, Washington.

I've completed Calculus 1, 2, and 3 as well as Elementary Differential Equations (Math 313).

My hobbies are cycling and cooking.

I was a former Navy pilot and now work as a Data Analyst/ BI Developer for a software company in Seattle, WA. I've decided to pursue a degree in mathematics because of my desire to move into a career in data science. I'm concurrently taking a course in practical statistics and programming in R from the University of Washington.

Derek Haynes
Aug 28, 2019

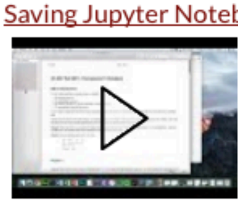
Hey all, I'm not sure if any of you are familiar with jupyter notebooks, but I've found them to be very useful in rendering latex inline. An added benefit is that you can save them as a pdf using print preview.

I've added a sample of what a jupyter notebook can do and would like to compare solutions for problem 1.1.30.

Here are some useful links

latex editor: https://www.codecogs.com/

how to export a jupyter notebook to pdf:
Saving Jupyter Notebooks as PDF files



HW1.1.14.pdf

View in discussion