

Source: [KBe2020math530refExrOnRetIndex](#)

Solve Equations

LinAlg 9 sep 2010 More Systems and proofs

$$\begin{bmatrix} 2 & -1 & x \\ 3 & 2 & 1 & y \\ 1 & -1 & 2 & z \end{bmatrix} = \begin{bmatrix} -1 \\ 7 \\ 4 \end{bmatrix}$$

1. add (1) and (3) to (2)

$$\begin{bmatrix} 0 & 0 & 0 \\ 1 & -1 & 2 & z \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$

2. subtract (1) from (2) to (2)

$$\begin{bmatrix} 3 & 0 & 1 & 301 \\ 0 & 3 & 2 & 302 \\ 0 & 0 & 2 & 303 \end{bmatrix} \xrightarrow{\text{divide (2) by } 3} \begin{bmatrix} 3 & 0 & 1 & 301 \\ 0 & 1 & 2 & 100 \\ 0 & 0 & 1 & 100 \end{bmatrix} \xrightarrow{\text{divide (2) by } 2} \begin{bmatrix} 3 & 0 & 1 & 301 \\ 0 & 1 & 1 & 50 \\ 0 & 0 & 1 & 100 \end{bmatrix}$$

3. divide (2) by 100

$$\begin{bmatrix} 3 & 0 & 1 & 301 \\ 0 & 1 & 1 & 50 \\ 0 & 0 & 1 & 100 \end{bmatrix} \xrightarrow{\text{subtract (2) from (1)}} \begin{bmatrix} 2 & 0 & 0 & 251 \\ 0 & 1 & 1 & 50 \\ 0 & 0 & 1 & 100 \end{bmatrix}$$

Just trying to get the identity. So I might as well find the inverse of the matrix, and just use that.

I guess I'll finish doing this one w/ row ops... but it's really tedious.

$\begin{bmatrix} 3 & 0 & 1 & 301 \\ 0 & 1 & 0 & 50 \\ 0 & 0 & 1 & 100 \end{bmatrix} \xrightarrow{\text{swap (1), (2)}} \begin{bmatrix} 0 & 1 & 0 & 50 \\ 3 & 0 & 1 & 301 \\ 0 & 0 & 1 & 100 \end{bmatrix} \xrightarrow{\text{add } (-3)(1) \text{ to (2)}} \begin{bmatrix} 0 & 1 & 0 & 50 \\ 0 & 1 & 1 & 301 \\ 0 & 0 & 1 & 100 \end{bmatrix} \xrightarrow{\text{subtract (2) from (1)}} \begin{bmatrix} 0 & 0 & 1 & 251 \\ 0 & 1 & 1 & 301 \\ 0 & 0 & 1 & 100 \end{bmatrix} \xrightarrow{\text{divide (1) by } 251} \begin{bmatrix} 0 & 0 & 1 & 1 \\ 0 & 1 & 1 & 301 \\ 0 & 0 & 1 & 100 \end{bmatrix} \xrightarrow{\text{subtract (1) from (2)}} \begin{bmatrix} 0 & 0 & 0 & 300 \\ 0 & 1 & 1 & 301 \\ 0 & 0 & 1 & 100 \end{bmatrix} \xrightarrow{\text{divide (2) by } 300} \begin{bmatrix} 0 & 0 & 0 & 1 \\ 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 100 \end{bmatrix} \xrightarrow{\text{subtract (2) from (3)}} \begin{bmatrix} 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 100 \end{bmatrix} \xrightarrow{\text{divide (3) by } 100} \begin{bmatrix} 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \end{bmatrix}$

Operation timed out. Arithmetic errors.

Read 1.B and 1.C

General Notes

- The distributive property is extremely useful ### 1.35 Example
- a) If $b = 0$ then we can divide all x_3 by 5 and combine the last two terms to get F^3 , which is a vector space, without loss of generality. If not, then when you try to multiply by a scalar then you will find that the above reasoning breaks (I think).
- b) $f(x) = 0$ is continuous, so the additive identity exists. All sums of continuous functions result in continuous functions, so it is closed under addition. And all scalar multiples also work out.
- c) slightly awkward: I don't actually know what a differentiable real valued function is. #todo-exrOn
- d) (see above)
- e) what does it mean for a sequence of complex numbers to have a limit 0? but I think you can use the same argument that the missing elements are just "collapsed" into one invisible one. ### 1.40 Definition direct sum

- Something about uniqueness?
 - If there is only one way to write zero then it works (1.44 Condition for a direct sum)

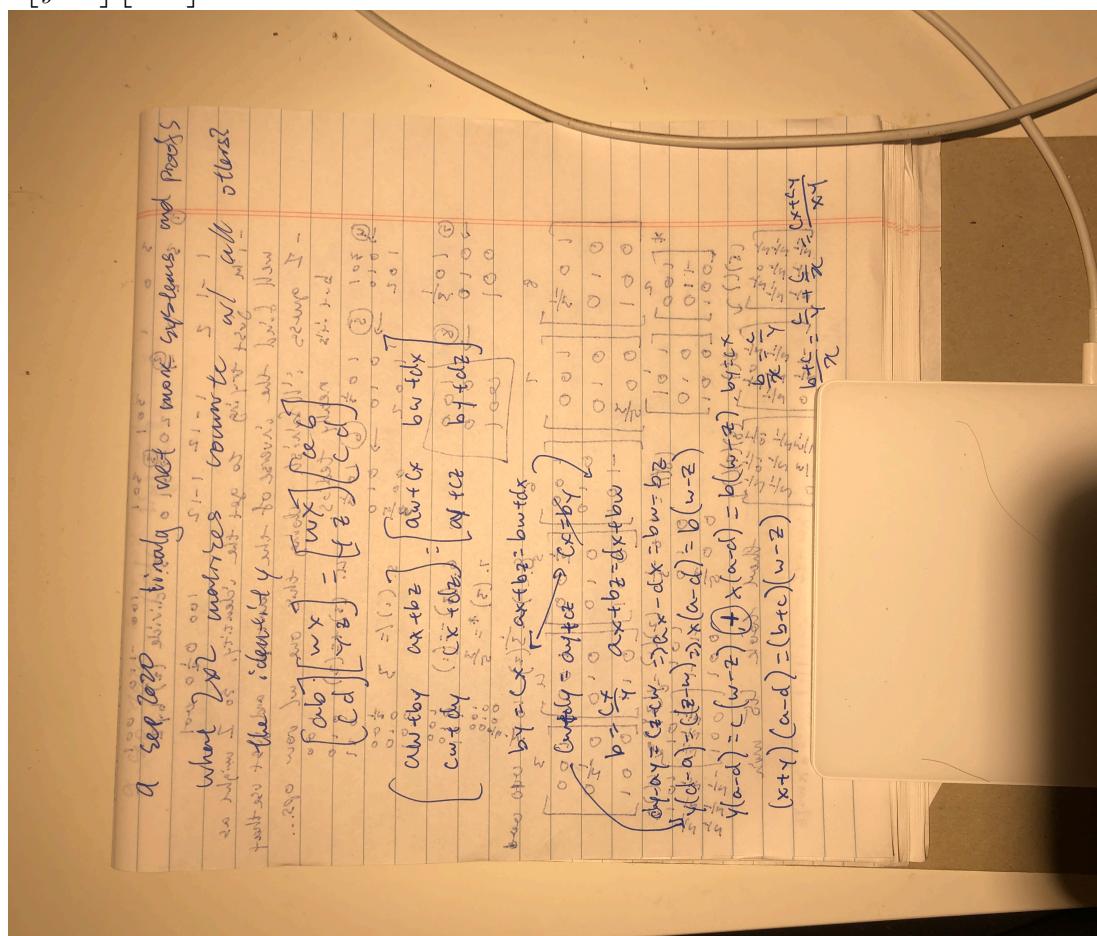
Exercise to present

I would be interested in 7, 8, 10, 12, 14-19

2x2 Matrices that are Commutative

(under multiplication, with all other 2×2 matrices)

Starting with $\begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} w & x \\ y & z \end{bmatrix} = \begin{bmatrix} w & x \\ y & z \end{bmatrix} \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, I got $(x+y)(a-d) = (b+c)(w-z)$ and $by = cx$, but wasn't



sure how to further develop it.

Epilogue

Linear algebra homework always takes so long. Even though I skip like half of the problems. This is kind of an issue.