

Linear. Test 1, Review.

Also study the quizzes, and homework problems!

1. Solve this system of equations, any way you like. Write the answer as a set of equations with free variable(s). Then write the answer as a linear combination of constant vectors using the free variable(s) as coefficients, and then as a parameterized line with parameter t .

$$\left\{ \begin{array}{l} x_1 - 2x_2 - 4x_3 = 3 \\ 2x_1 - x_2 + x_3 = 0 \end{array} \right\}$$

2. Solve this system of equations, any way you like. Write the answer as a set of equations with free variable(s). Write the answer as a linear combination of constant vectors using the free variable(s) as coefficients, then as a parameterized line with parameter t .

$$\left\{ \begin{array}{l} x - 3z = 3 \\ y + z = 0 \end{array} \right\}$$

3. Solve this system of equations, any way you like. Write the answer as a linear combination of constant vectors using the free variable(s) as coefficients.

$$\left\{ \begin{array}{l} x - 3z = 3 \\ y = 0 \end{array} \right\}$$

$$A = \begin{bmatrix} 0 & 0 & 2 \\ 1 & 0 & 0 \\ 0 & 3 & 0 \end{bmatrix}$$

4. Find $\det(A)$.
5. Are the columns of A lin. dep. or lin. indep.?
6. Are the rows of A lin. dep. or lin. indep.?
7. Does A have an inverse? If so, find A^{-1} .
8. How many solutions are there to the equation $A\mathbf{x} = \mathbf{0}$? Find the solution if it exists.
9. How many solutions can there be to the equation $A\mathbf{x} = \mathbf{b}$, for $\mathbf{b} \neq \mathbf{0}$?
10. Solve the equation $A\mathbf{x} = \mathbf{b}$, for $\mathbf{b} = (1, 1, 1)$. You can always write \mathbf{b} as a column for the sake of setting up the problem.
11. Is $\mathbf{b} = (2, 1, 0)$ in the span of the columns of A ?
12. Is there a way to make the third column of A as a lin. comb. of the first two columns?
13. Find $\det(A^{-1})$.
14. Find A^t .
15. Find $\det(A^t)$.

$$B = \begin{bmatrix} 1 & 0 & 2 \\ 1 & 0 & 0 \\ 3 & 0 & 6 \end{bmatrix}$$

16. Find $\det(B)$.
17. Are the columns of B lin. dep. or lin. indep.?
18. Are the rows of B lin. dep. or lin. indep.?
19. Does B have an inverse? If so, find B^{-1} .
20. How many solutions are there to the equation $B\mathbf{x} = \mathbf{0}$? Find the solution if it exists.
21. How many solutions can there be to the equation $B\mathbf{x} = \mathbf{b}$, for $\mathbf{b} \neq \mathbf{0}$?
22. Solve the equation $B\mathbf{x} = \mathbf{b}$, for $\mathbf{b} = (1, 1, 1)$.
23. Find AB .
24. Find BA .
25. Find $\det(BA)$.

$$C = \begin{bmatrix} 1 & 0 & 2 & 4 \\ -1 & 0 & -2 & 3 \end{bmatrix}$$

26. Are the columns of C lin. dep. or lin. indep.?
27. Are the rows of C lin. dep. or lin. indep.?
28. How many solutions are there to the equation $C\mathbf{x} = \mathbf{0}$? Find the solution if it exists.
29. How many solutions can there be to the equation $C\mathbf{x} = \mathbf{b}$, for $\mathbf{b} \neq \mathbf{0}$?
30. Solve the equation $C\mathbf{x} = \mathbf{b}$, for $\mathbf{b} = (7, 7)$.
31. How many solutions can there be to the equation $C^t\mathbf{x} = \mathbf{b}$, for $\mathbf{b} \neq \mathbf{0}$?