

NO CALCULATOR!!

Multiply the following matrices:

$$1) \begin{bmatrix} 4 & 1 \\ -3 & 7 \end{bmatrix} \bullet \begin{bmatrix} -3 & 4 \\ 6 & 9 \end{bmatrix}$$

$$2) \begin{bmatrix} 0 & 5 & 7 & -1 \end{bmatrix} \bullet \begin{bmatrix} -3 & 8 \\ 1 & 2 \\ 0 & -5 \\ 4 & 3 \end{bmatrix}$$

Solve for the missing variables:

$$3) \begin{bmatrix} 3x & -2 \\ -1 & 8 \end{bmatrix} + \begin{bmatrix} -4 & 0 \\ -7 & -8 \end{bmatrix} = \begin{bmatrix} -16 & -2 \\ y & 0 \end{bmatrix}$$

$$4) \begin{bmatrix} -2 & 1 & 2 \\ 3 & 2 & 4 \\ 0 & -2 & 4 \end{bmatrix} \begin{bmatrix} 1 \\ x \\ 3 \end{bmatrix} = \begin{bmatrix} 6 \\ 19 \\ y \end{bmatrix}$$

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Find the following determinants BY HAND:

$$5) \begin{vmatrix} -4 & 2 \\ 5 & -2 \end{vmatrix}$$

$$6) \begin{vmatrix} 12 & 2 \\ -5 & 8 \end{vmatrix}$$

$$7) \begin{vmatrix} 3 & -12 & 1 \\ 10 & 9 & 0 \\ -5 & 6 & -2 \end{vmatrix}$$

- 8) If the area of triangle ABC is 5, find the value(s) of y if the vertices of the triangle are $A(1,2)$, $B(4,0)$ and $C(1,y)$.

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Find the following inverses BY HAND:

$$9) \begin{bmatrix} 4 & -5 \\ -3 & 4 \end{bmatrix}$$

$$10) \begin{bmatrix} 1 & 8 \\ 1 & 7 \end{bmatrix}$$

$$11) \begin{bmatrix} 7 & 2 \\ 3 & 1 \end{bmatrix}$$

13) Verify the following are inverses by multiplying BY HAND- show all the steps
- what is the name of the final matrix?

$$\begin{bmatrix} -4 & 3 \\ -3 & 2 \end{bmatrix}, \begin{bmatrix} 2 & -3 \\ 3 & -4 \end{bmatrix}$$

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Calculator Friendly! ☺

Multiply the following matrices:

$$1) \begin{bmatrix} 4 & 0 \\ -3 & -6 \end{bmatrix} \cdot \begin{bmatrix} 2 & -2 \\ -9 & 4 \end{bmatrix}$$

$$2) \begin{bmatrix} -9 & 3 & 0 & 1 \\ -2 & 4 & -5 & 6 \end{bmatrix} \cdot \begin{bmatrix} -3 & 8 \\ 1 & 2 \\ 0 & -5 \\ 4 & 3 \end{bmatrix}$$

- 3) The numbers of calories burned by individuals of different body weights performing different types of aerobic exercises for a 20 minute time period are shown in the matrix below:

$$A = \begin{array}{cc} & \begin{array}{cc} 120\text{lb} & 150\text{lb} \end{array} \\ \begin{array}{c} \text{bicycling} \\ \text{jogging} \\ \text{walking} \end{array} & \begin{bmatrix} 109 & 136 \\ 127 & 159 \\ 64 & 79 \end{bmatrix} \end{array}$$

A 120 lb person and a 150 lb person bicycled for 40 minutes, jogged for 10 minutes and walked for 60 minutes. Organize the time spent exercising in a matrix named B:

Compute BA and interpret the result. Be sure to use labels on your answer matrix!

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Using the determinant and the area formula that goes with it, find the area of the triangle with the given vertices:

4) (0,1) (2,7) (5,5)

5) (2,-6) (-1,-4) (0,2)

Find the inverses of the following matrices using your calculator:

6) $\begin{bmatrix} -3 & 4 \\ 7 & 9 \end{bmatrix}$

7) $\begin{bmatrix} 2 & 1 & -2 \\ 5 & 3 & 0 \\ 4 & 3 & 8 \end{bmatrix}$

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_	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26

8) Use $A = \begin{bmatrix} 1 & 2 \\ 1 & 3 \end{bmatrix}$ to encode the message TOO MANY SECRETS. Show how the matrices are set up:

Encoded message: _____

9) The message below was coded using matrix $A = \begin{bmatrix} 1 & 1 \\ 1 & 2 \end{bmatrix}$. Decode the message by multiplying by the inverse and spell out the original message:

Coded message: 18 33 27 39

Message: _____

10) Decode the message 42, 107, 10, 25, 20, 40 that was coded with $A = \begin{bmatrix} 1 & 2 \\ 1 & 3 \end{bmatrix}$ and spell out the original message.

Message: _____

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Solve the following systems of equations by setting up matrices and using inverses to solve. Show the matrix equation you are using to solve including the operation.

11) $2x + 5y + w = 11$
 $x + 4y + 2z - 2w = -7$
 $2x - 2y + 5z + w = 3$
 $x - 3w = 1$

- 12) In the 2005 Orange Bowl, the University of Southern California won the National Championship by defeating the University of Oklahoma by a score of 55 to 19. The total points scored came from 22 different scoring plays, which were a combination of touchdowns, extra-point kicks, field goals and safeties, worth 6, 1, 3 and 2 points, respectively. The same number of touchdowns and extra-point kicks were scored, and there were three times as many field goals as safeties. How many touchdowns, extra-point kicks, field goals, and safeties were scored?