

Name: \_\_\_\_\_

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There are 10 points possible on this quiz. No aids (book, calculator, etc.) are permitted. **This is a short-answer quiz.**

Questions below concern matrices  $A$ ,  $B$ ,  $C$  and  $D$  below.

$$A = \begin{pmatrix} 1 & -1 \\ 2 & 3 \end{pmatrix} \quad B = \begin{pmatrix} 1 & 0 \\ 1 & 2 \\ 0 & -4 \end{pmatrix} \quad C = \begin{pmatrix} 2 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 2 & 3 \end{pmatrix}, \quad D = \begin{pmatrix} 0 & 1 \\ 2 & 0 \end{pmatrix}$$

1. (1 point) Find  $A + 3D$

$$A + 3D = \begin{pmatrix} 1 & -1 \\ 2 & 3 \end{pmatrix} + \begin{pmatrix} 0 & 3 \\ 6 & 0 \end{pmatrix} = \begin{pmatrix} 1 & -2 \\ 8 & 3 \end{pmatrix}$$

2. (2 points) Find the product  $BA$ .

$$\begin{pmatrix} 1 & 0 \\ 1 & 2 \\ 0 & -4 \end{pmatrix} \begin{pmatrix} 1 & -1 \\ 2 & 3 \end{pmatrix} = \begin{pmatrix} 1 & -1 \\ 5 & 5 \\ -8 & -12 \end{pmatrix}$$

3. (2 points) Find a  $3 \times 3$  matrix  $M$  such that the resulting product  $MC$  corresponds to the row operation:  $r_3 - 2r_1 \mapsto r_3$ .

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

4. (4 points) Find  $C^{-1}$ .

$$\left( \begin{array}{ccc|ccc} 2 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 & 0 \\ 0 & 2 & 3 & 0 & 0 & 1 \end{array} \right) \xrightarrow{\text{rref}} \left( \begin{array}{ccc|ccc} 1 & 0 & 0 & \frac{1}{2} & 0 & 0 \\ 0 & 1 & 0 & 0 & 3 & -1 \\ 0 & 0 & 1 & 0 & -2 & 1 \end{array} \right); \quad C^{-1} = \begin{pmatrix} \frac{1}{2} & 0 & 0 \\ 0 & 3 & -1 \\ 0 & -2 & 1 \end{pmatrix}$$

5. (1 point) Change <sup>one</sup> entry in  $A$  such that the resulting matrix has no inverse.

$$A = \begin{pmatrix} 1 & -1 \\ 2 & 3 \end{pmatrix}; \text{ change to } \begin{pmatrix} 1 & -1 \\ 2 & -2 \end{pmatrix}$$