

Please show all necessary work completely and clearly.

- (1) (6 Points) Calculate the inverse of the matrix

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

Answer: The inverse is

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

There are multiple acceptable approaches. One is the book method of starting with our matrix and the identity together in one block matrix, and calculating reduced echelon form.

In this case:

-2 points for writing down the block matrix

-If they reduce it to reduced echelon form, give the remaining 4 points, minus 1 for each incorrect row operation (i.e. each algebra mistake). It is okay if they leave it in reduced echelon form without explicitly saying that the inverse is the right-hand matrix.

-If they don't make it to reduced echelon form, give 2 additional points if they do at least 2 row operations and all operations are correct (total 4 points). Give 1 point otherwise (total 3)

—

They might also use another method. For instance, assume that B is an inverse matrix with entries x_{ij} , set $AB = I$, and solve for the coefficients.

In this case, give 2 points for setting it up, and give a fraction of the remaining 4 points proportional to the number of entries they calculate correctly.

(Hopefully no one does this)

- (2) (4 Points) Calculate the determinant of the following matrix by expanding along the first row:

$$\begin{pmatrix} 1 & 1 & -3 \\ 2 & 11 & 3 \\ -1 & -3 & 1 \end{pmatrix}$$

Answer: 0.

-Give them 2 points for the first step- writing out the sum of cofactors.

-Of the remaining 2 points, deduct one for each small algebra mistake (neglecting a minus sign, for example).

-If they give the correct answer but expand along a different row or column, for some reason, take off 1 point.