MS-A0001 - Matrix Algebra, 26.10.2020-08.12.2020

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Grade	**2.00** out of 2.00 (**100**%)

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Question **1**

Flag question Mark 1.00 out of 1.00 Correct

Let

$$\mathrm{A} = \begin{bmatrix} 36 & 40 & 76 \\ -56 & -76 & -168 \\ 14 & 20 & 46 \end{bmatrix}.$$

Compute the determinant of A

$\det(\mathrm{A}) =$ -192

Your last answer was interpreted as follows:

$$-192$$

Your answer is correct!
Marks for this submission: 1.00/1.00.

Worked solution:

$$\begin{aligned} \det(\mathrm{A}) &= \begin{vmatrix} 36 & 40 & 76 \\ -56 & -76 & -168 \\ 14 & 20 & 46 \end{vmatrix} \\ &= 36 \cdot \begin{vmatrix} -76 & -168 \\ 20 & 46 \end{vmatrix} - 40 \cdot \begin{vmatrix} -56 & -168 \\ 14 & 46 \end{vmatrix} + 76 \cdot \begin{vmatrix} -56 & -76 \\ 14 & 20 \end{vmatrix} \\ &= 36 \cdot (-76 \cdot 46 - (-168) \cdot 20) - 40 \cdot (-56 \cdot 46 - (-168) \cdot 14) + 76 \cdot (-56 \cdot 20 - (-76 \\ &= -192 \end{aligned}$$

A correct answer is -192, which can be typed in as follows: -192

Question **2**

Flag question Mark 1.00 out of 1.00 Correct

Compute the determinants of

$$\mathrm{A} = \begin{bmatrix} 5 & 5 & -4 \\ 5 & 4 & 5 \\ 5 & 4 & -4 \end{bmatrix} \text{ and } \mathrm{B} = \begin{bmatrix} 5 & 0 & 0 & -4 \\ -4 & 0 & 0 & 5 \\ 5 & 0 & -4 & 0 \\ 0 & -4 & 5 & 4 \end{bmatrix}.$$

$\det(\mathrm{A}) =$ 45

$\det(\mathrm{B}) =$ -144

Your answer is correct!
Your answer is correct!
$\det(\mathrm{A})$ is correct!
Marks for this submission: 0.50/0.50.
Your answer is correct!
$\det(\mathrm{B})$ is correct!
Marks for this submission: 0.50/0.50.

Worked solution:
Determinants can be calculated for example by reducing the matrix to an upper triangle matrix or developing the determinant with respect to some row or column. Let's compute $\det(\mathrm{A})$ by developing it with respect to the first row:

$$\begin{aligned} \det(\mathrm{A}) &= 5 \begin{vmatrix} 4 & 5 \\ 4 & -4 \end{vmatrix} - 5 \begin{vmatrix} 5 & 5 \\ 5 & -4 \end{vmatrix} + (-4) \begin{vmatrix} 5 & 4 \\ 5 & 4 \end{vmatrix} \\ &= 5(4 \cdot (-4) - 5 \cdot 4) - 5(5 \cdot (-4) - 5^2) + (-4)(5 \cdot 4 - 5 \cdot 4) \\ &= 45. \end{aligned}$$

The column of B with the most zeros is the second column, so let's develop the determinant with respect to that:

$$\det(\mathrm{B}) = (-4) \begin{vmatrix} 5 & 0 & -4 \\ -4 & 0 & 5 \\ 5 & -4 & 0 \end{vmatrix}.$$

Here the 3×3-determinant reduces to a 2×2-determinant when developed with respect to the second column:

$$\det(\mathrm{B}) = (-4) \cdot (-(-4)) \begin{vmatrix} 5 & -4 \\ -4 & 5 \end{vmatrix} = -4^2(5^2 - (-4)^2) = -144.$$

A correct answer is 45, which can be typed in as follows: 45

A correct answer is -144, which can be typed in as follows: -144

Finish review

◄ Lecture 8 Lecture 10 ►