

MS-A0001 - Matrix Algebra,
26.10.2020-08.12.2020

Grades

Sections

» Welcome

» Materials

» Assignments

» STACK

» Homework Submission

» ONLINE EXAM

» END EXAM 8.12

Dashboard

Site home

Calendar

Learner Metrics

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MS-A0001 - Matrix Algebra, 26.10.2020-08.12.2020

Dashboard / Courses / School of Science / department of... / ms-a0001 - ma... / Sections / STACK / Lecture 9

Started on	Friday, 27 November 2020, 4:56 AM
State	Finished
Completed on	Friday, 27 November 2020, 5:00 AM
Time taken	3 mins 59 secs
Grade	2.00 out of 2.00 (100%)

Quiz navigation

1

2

✓

✓

Finish review

Question 1

Flag questionMark 1.00 out of 1.00Correct

Let

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

Compute the determinant of A

det(A) =

Your last answer was interpreted as follows:

−192

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

Worked solution:

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

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

Question 2

Flag questionMark 1.00 out of 1.00Correct

Compute the determinants of

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

det(A) =

det(B) =

Your answer is correct!
Your answer is correct!
det(A) is correct!
Marks for this submission: 0.50/0.50.
Your answer is correct!
det(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(A) by developing it with respect to the first row:

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

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

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

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

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

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 ▶

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Binh Nguyen (Log out)