

The screenshot shows a web-based testing application running in a Microsoft Edge browser. The address bar indicates the URL is https://wilp.wheelbox.com/WET-2/running_testv2.obj. The page features a prominent green header bar at the top, which includes the user's name "TANMAY JAIN" and ID "2022aa05306". To the right of the header are three buttons: "Calculator", "View Instructions", and "Help Center". On the left side, there is a vertical sidebar with a "Question Panel" containing eight numbered buttons (01-08). The central part of the screen displays "Question No: 01" followed by a prompt indicating it is a subjective question requiring a text answer. The question itself asks for the standard inner product in \mathbb{R}^3 with respect to a given basis, and also requests the inner product between two specific vectors. Below the question, there is a text input field and a "[4 Marks]" label. Underneath the input field is a rich text editor with a toolbar offering various formatting options like bold, italic, bulleted lists, etc. At the bottom of the page, a green bar contains three elements: a "Next >" button, a "Chat with Proctor - TANMAY JAIN" link, and an "End Test" button. A large, semi-transparent circular watermark with the alphanumeric string "2022aa05306" is centered over the entire page content.

Activities Microsoft Edge (beta) Sat Jan 28, 2:03:29 PM

https://wilp.wheelbox.com/WET-2/running_testv2.obj - Personal - Microsoft Edge Beta

https://wilp.wheelbox.com/WET-2/running_testv2.obj

TANMAY JAIN (2022aa05306)

Question Panel

01 02 03 04 05
06 07 08

Calculator View Instructions Help Center

Question No: 02
2022aa05306
This is a subjective question, hence you have to write your answer in the Text-Field given below.

(a) Let A and B be two $n \times n$ matrices. A Linear Algebra Professor asked whether rank of B and AB are the same if A has full rank. What should be the answer? Justify.
(b) If $A^2 = A$, $B^2 = B$ and $I - A - B$ is invertible then help the students to prove A and B are of same rank. [5 Marks]

Options

Upload Answer Sheet Using-Mobile View Uploaded Images

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TANMAY JAIN (2022aa05306)

Question Panel

01 02 03 04 05
06 07 08

Calculator View Instructions Help Center

Question No: 03

A student in MTech datascience was revising Linear Algebra for his end semester exam. Then he came across a 3 by 3 matrix named G in a linear algebra textbook.

$$G = \begin{bmatrix} 2 & \gamma & 0 \\ \gamma & 2 & \gamma \\ 0 & \gamma & 2 \end{bmatrix}$$

where γ is an unknown real number. His friend named A1 then asked him the following questions about this matrix :

(a) For which possible values of parameter γ , can we be sure that the matrix G will only have non-zero eigenvalues.

(b) If all the eigenvalues of G are known to be positive then what is the possible range of values that parameter γ can take.

Derive answer to the questions asked by A1. [4 Marks]

Options

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TANMAY JAIN
(2022aa05306)

TANMAY JAIN
2022aa05306

Question Panel

01 02 03 04 05

06 07 08

Calculator View Instructions Help Center

Question No: 04

This is a subjective question, hence you have to write your answer in the Text-Field given below.

Consider a vector $\mathbf{r} \in \mathbb{R}^k$. Here $k > 102$. Consider a matrix M defined as follows : $M = \mathbf{r}\mathbf{r}^T$. Based on this definition answer the following :

(a) How many non-zero eigenvalues does the matrix M have ? Derive all the nonzero eigenvalues.

(b) Find the sum of absolute value of eigenvalues of this matrix i.e $\sum_{i=1}^k |\lambda_i|$ where λ_i is the i^{th} eigenvalues of M .

(c) How many non-zero singular values does M^TM have. Also, derive the value of all non-zero singular value of M^TM .

[4 Marks]

Options

Upload Answer Sheet Using-Mobile View Uploaded Images

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End Test

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The screenshot shows a Microsoft Edge browser window at the URL https://wilp.wheelbox.com/WET-2/running_testv2.obj. The page has a green header bar with the user's name "TANMAY JAIN" and ID "2022aa05306". Below the header, there are three buttons: "Calculator", "View Instructions", and "Help Center". On the left side, there is a "Question Panel" with a grid of question numbers from 01 to 08. Question 06 is selected. The main area displays "Question No: 06" and a watermark "2022aa05306". The question text reads: "This is a subjective question, hence you have to write your answer in the Text-Field given below. Let the vector $f \cong 2x_1^2 + 2x_1x_2 + 3x_2^2 - x_1 - x_2$. Calculate the gradient of f and find a point where it vanishes, if there exists such a point. [3 Marks]". Below the question, there is an "Options" section. At the bottom right, there are two buttons: "Upload Answer Sheet Using-Mobile" and "View Uploaded Images". A large text input field is provided for the answer, with a character limit of "20000(Max. Upto 20000 Characters)". Above the input field is a rich text editor toolbar with various formatting options like bold, italic, underline, and bullet points. At the very bottom, there is a green bar with a "Chat with Proctor - TANMAY JAIN" button and a "+" icon. In the bottom right corner of the browser window, there is a circular camera icon.

Activities Microsoft Edge (beta) Sat Jan 28, 2:03:45 PM

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https://wilp.wheelbox.com/WET-2/running_testv2.obj

TANMAY JAIN (2022aa05306)

Question Panel

01 02 03 04 05
06 07 08

Calculator View Instructions Help Center

Question No: 07
2022aa05306
This is a subjective question, hence you have to write your answer in the Text-Field given below.

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(a) Let $V = \{p(x)/p(x) = \sum_{i=0}^5 c_i x^i, p(a) = 0\}$ be set of all polynomials of degree less than or equal to 5 with a as its root with usual scalar multiplication and polynomial addition. Is V a vector space? Justify. If yes, find a basis for V

(b) Let $V = \{A \in M_{2 \times 2}(R)/A^{-1} \text{ exists}\}$ be set of all invertible real matrices of order 2 with usual scalar multiplication and matrix addition. Is V a vector space? Justify.

(c) If we replace matrix addition by matrix multiplication in the above set, is V a vector space? Justify. [3 Marks]

Options

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TANMAY JAIN (2022aa05306)

Question Panel

01 02 03 04 05
06 07 08

Calculator View Instructions Help Center

Question No: 08
2022aa05306
This is a subjective question, hence you have to write your answer in the Text-Field given below.

Can the function $f(x) = 1 + 2x + 3x^2/2$ be the Taylor's series expansion to three terms for a function of the form $e^{\alpha x + \beta}$ around $x = 0$? If so, find α and β . Otherwise, explain why the given polynomial cannot be a Taylor series expansion of a function of the form $e^{\alpha x + \beta}$? [4 Marks]

Options

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