Feedback — III. Linear Algebra

Question 1

Let two matrices be

$$A = \begin{bmatrix} 1 & -4 \\ -2 & 1 \end{bmatrix}, \qquad B = \begin{bmatrix} 0 & 3 \\ 5 & 8 \end{bmatrix}$$

What is A - B?

Your Answer		Score	Explanation
○	$\begin{bmatrix} 1 & 7 \\ 7 & 9 \end{bmatrix}$		
○	$\begin{bmatrix} 1 & -7 \\ -7 & 7 \end{bmatrix}$		
◉	$\begin{bmatrix} 1 & -7 \\ -7 & -7 \end{bmatrix}$	✔ 1.00	
○	$\begin{bmatrix} 1 & 1 \\ -3 & -7 \end{bmatrix}$		
Total		1.00 / 1.00	

Question 2

Let $x = \begin{bmatrix} 2 \\ 7 \\ 4 \\ 1 \end{bmatrix}$

What is $\frac{1}{2} * x$?

Your Answer	Score	Explanation
○ $\begin{bmatrix} 1 & \frac{7}{2} & 2 & \frac{1}{2} \end{bmatrix}$		
○ $\begin{bmatrix} 4 \\ 14 \\ 8 \\ 2 \end{bmatrix}$		
◉ $\begin{bmatrix} 1 \\ \frac{7}{2} \\ 2 \\ \frac{1}{2} \end{bmatrix}$ ✔	1.00	To multiply the vector x by $\frac{1}{2}$, take each element of x and multiply that element by $\frac{1}{2}$.
○ $\begin{bmatrix} 4 & 14 & 8 & 2 \end{bmatrix}$		
Total	1.00 / 1.00	

Question 3

Let u be a 3-dimensional vector, where specifically

$$u = \begin{bmatrix} 3 \\ 5 \\ 1 \end{bmatrix}$$

What is u^{T}?

Your Answer	Score	Explanation
○ $\begin{bmatrix} 1 & 5 & 3 \end{bmatrix}$		

$$\begin{bmatrix} 3 \\ 5 \\ 1 \end{bmatrix}$$

○

$\begin{bmatrix} 3 & 5 & 1 \end{bmatrix}$ ✔   1.00

○

$$\begin{bmatrix} 1 \\ 5 \\ 3 \end{bmatrix}$$

Total	1.00 / 1.00

Question 4

Let u and v be 3-dimensional vectors, where specifically

$$u = \begin{bmatrix} -3 \\ 4 \\ 3 \end{bmatrix} \text{ and } v = \begin{bmatrix} 3 \\ 1 \\ 5 \end{bmatrix}$$

What is $u^T v$?

(Hint: u^T is a 1x3 dimensional matrix, and v can also be seen as a 3x1 matrix. The answer you want can be obtained by taking the matrix product of u^T and v.)

You entered:

10

Your Answer		Score	Explanation
10	✔	1.00	
Total		1.00 / 1.00	

Question 5

Let A and B be 3x3 (square) matrices. Which of the following must necessarily hold true?

Your Answer		Score	Explanation
☐ If $C = A * B$, then C is a 6x6 matrix.	✔	0.25	Since A and B are both 3x3 matrices, their product is 3x3. More generally, if A were an $m \times n$. matrix, and B a $n \times o$ matrix, then C would be $m \times o$. (In our example, $m = n = o = 3$.)
☑ If $C = A * B$, then C is a 3x3 matrix.	✔	0.25	Since A and B are both 3x3 matrices, their product is 3x3. More generally, if A were an $m \times n$. matrix, and B a $n \times o$ matrix, then C would be $m \times o$. (In our example, $m = n = o = 3$.)
☐ If v is a 3 dimensional vector, then $A * B * v$ is a 3 dimensional vector.	✘	0.00	Since A and B are both 3x3 matrices, $A * B$ is 3x3 matrix. Thus, $(A * B) * v$ is a 3x3 matrix times a 3×1 matrix (since v is a 3 dimensional vector, and thus also a 3x1 matrix), and the result gives a 3x1 vector.
☐ $A * B = B * A$	✔	0.25	We saw in the lecture that matrix multiplication is not commutative in general.
Total		0.75 / 1.00	