CSPB 2820 - Truong - Linear Algebra with Computer Science Applications

Started on	Thursday, 31 August 2023, 9:24 PM
State	Finished
Completed on	Thursday, 31 August 2023, 9:29 PM
Time taken	5 mins 12 secs
Grade	**10.00** out of 10.00 (**100**%)

Question **1**

Correct

Mark 2.00 out of 2.00

$v = \begin{bmatrix} 3 \\ 2 \\ 6 \\ 4 \end{bmatrix} + \begin{bmatrix} 1 \\ 1 \\ 3 \\ 0 \end{bmatrix}$. What is the value of v_3?

9

Your last answer was interpreted as follows: 9

Correct answer, well done.
Marks for this submission: 2.00/2.00.

Question **2**

Correct

Mark 2.00 out of 2.00

Given
$\alpha = 2$
$u = \begin{bmatrix} 1 \\ 0 \\ 1 \\ 5 \end{bmatrix}$
$v = \alpha u$

what is the value of v_3 ?

2

Your last answer was interpreted as follows: 2

Correct answer, well done.
Marks for this submission: 2.00/2.00.

Question **3**

Correct

Mark 2.00 out of 2.00

Given $u = \begin{bmatrix} -2 \\ -2 \\ 1 \\ 2 \end{bmatrix}, v = \begin{bmatrix} 0 \\ 1 \\ 0 \\ -2 \end{bmatrix}$, what is the value of $u^T v$?

-6

Your last answer was interpreted as follows: -6

Correct answer, well done.
Marks for this submission: 2.00/2.00.

Question **4**

Correct

Mark 1.00 out of 1.00

1.1 *Vector equations.* Determine whether each of the equations below is true, false, or contains bad notation (and therefore does not make sense).

(a) $\begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix} = (1, 2, 1).$

(b) $\begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix} = \begin{bmatrix} 1, & 2, & 1 \end{bmatrix}.$

(c) $(1, (2, 1)) = ((1, 2), 1).$

For part a) True, good notatation ✔

For part b) False, bad notation ✔

For part c) True, good notatation ✔

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **5**

Correct

Mark 1.00 out of 1.00

1.2 *Vector notation.* Which of the following expressions uses correct notation? When the expression does make sense, give its length. In the following, a and b are 10-vectors, and c is a 20-vector.

(a) $a + b - c_{3:12}$.

(b) $(a, b, c_{3:13})$.

(c) $2a + c$.

(d) $(a, 1) + (c_1, b)$.

(e) $((a, b), a)$.

(f) $\begin{bmatrix} a & b \end{bmatrix} + 4c$.

(g) $\begin{bmatrix} a \\ b \end{bmatrix} + 4c$.

a) Correct - length 10 ✔

b) Correct - length 31 (2 ten vectors and an 11 vector) ✔

c) Incorrect ✔

d) Correct - each vector is length 11 ✔

e) Correct - length 30 ((a,b) is 20, and a is ten, so 30 altogether.) ✔

f) Incorrect ✔

g) Correct - Length 20 (the vector length 20 is added to another vector, 4c length 20) ✔

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **6**

Correct

Mark 2.00 out of 2.00

Watch the

here, from 2:20 - 8:20.

Link if there is embedded video issue: https://youtu.be/Ih3rIcBnnSg?si=wB8bdHkSq5xITTL0&t=140

Compare these properties of vectors to the fundamental rules of algebra (field axioms) for addition.

-

name	addition	multiplication
associativity	$(a+b)+c=a+(b+c)$	$(a\,b)\,c=a\,(b\,c)$
commutativity	$a+b=b+a$	$a\,b=b\,a$
distributivity	$a\,(b+c)=a\,b+a\,c$	$(a+b)\,c=a\,c+b\,c$
identity	$a+0=a=0+a$	$a\cdot 1=a=1\cdot a$
inverses	$a+(-a)=0=(-a)+a$	$a\,a^{-1}=1=a^{-1}\,a$ if $a\neq 0$

Which of the following are true?

Select one or more:

- [x] a.
  The inverse property in not shown in the video, however, for vectors of the same length, it can be shown that, similarly, inverses exist and correspond to scalar multiplication by −1. ✔
- [x] b.
  Showing any of these properties with an example or simple proof would be a good exam question. ✔
- [x] c.

With the vector properties we need to be careful about whether or not we are using vectors or scalars since the notation may not always make this clear (however, the context should) ✔

d.
The actions are similar, however, the algebra properties work on all Real Numbers, while vector addition only works (is defined) on vectors of the same length. ✔

e.
They are completely identical.

Your answer is correct.

Correct

Marks for this submission: 2.00/2.00.