# CSPB 2820 - Truong - Linear Algebra with Computer Science Applications



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| **Started on** | Monday, 16 October 2023, 9:17 PM |
| **State** | Finished |
| **Completed on** | Monday, 16 October 2023, 10:00 PM |
| **Time taken** | 42 mins 52 secs |
| **Grade** | Not yet graded |

Question **1**

Correct

Mark 1.00 out of 1.00

Choose the matrix A for which A x = ($x_2$, $x_3$, $x_4$, $x_5$, $x_6$), where x is a 7 vector.

a. none of these

b. ✔

$$A = \begin{bmatrix} 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{bmatrix}$$

c.

$$A = \begin{bmatrix} 1 & 1 & 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 1 & 1 \end{bmatrix}$$

d.

$$A = \begin{bmatrix} 1 & 1 & 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 1 & 1 \end{bmatrix}$$

e.

$$A = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 \end{bmatrix}$$

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **2**

Correct

Mark 1.00 out of 1.00

Using the correct A from the question above, what is the result of A x when x = (1, 2, 3, 4, 5, 6, 7) ?

a. (3, 4, 5)

b. (1, 2, 3, 4, 5)

c. (3, 4, 5, 6, 7)

d. (2, 3, 4, 5, 6) ✔

e. (1, 2, 3, 4, 5, 6, 7)

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **3**

Correct

Mark 1.00 out of 1.00

Are the non-zero vector equivalent ROWS of the incidence matrix of a graph are always linearly independent?

- (●) a. No, they are always dependent. Consider the sum of the rows. ✔
- ( ) b. It depends on the particular graph.
- ( ) c. When the entries of the incidence matrix are > 1, then the rows of the incidence matrix of a graph are always linearly independent
- ( ) d. Yes, but there is no possible way to show this is true.
- ( ) e. One can construct a particular graph where the rows of the incidence matrix of a graph are always linearly independent

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **4**

Correct

Mark 1.00 out of 1.00

Does the sum of each column in an incidence matrix always add to 0?

*(definition from of an incidence matrix, from Chapter 7, included at the end of the exam if needed)*

Select one or more:

- [ ] No, because the number of edges is always less than the number of nodes.
- [ ] No, when multiple edges come from a single node, the sum of the column can be < 0.
- [x] Each column represents one edge, which must go from one node, 1, and away from another, -1, and not interact with the other nodes, 0. Thus the sum is always 1 - 1 = 0. ✔
- [ ] No, when multiple edges are directed to a single node, the sum of the column can be > 0.
- [ ] No, because the number of nodes is always greater than the number of edges.

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **5**

Correct

Mark 1.00 out of 1.00

Suppose A is the incidence matrix of a graph.

-A is the incidence matrix of the reverse graph (a graph where all edges are reversed).

Select one:

- True ✔
- False

Correct

Marks for this submission: 1.00/1.00.

Question **6**

Complete

Marked out of 5.00

Create your own simple graph and its incidence matrix.

Use 5 node and at leat 8 edges.

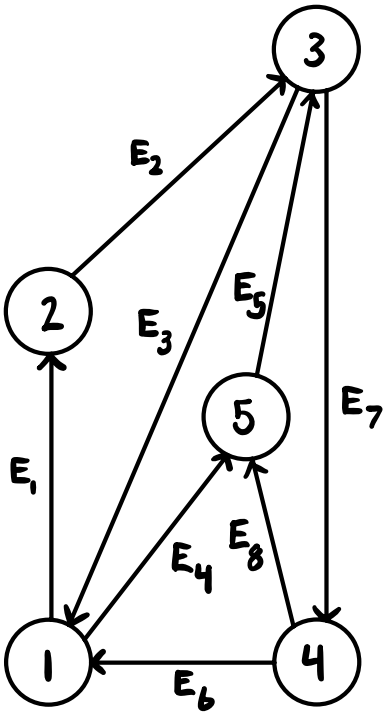
This should be more than minor adjustments to the book example.

Upload a screenshot or file - please just drag and drop if you can.

I have included my version of an incidence matrix and simple graph with 5 nodes and 8 edges as a PDF below.

Incidence Matrix And Graph.pdf

# Number 6




$$\begin{bmatrix} -1 & 0 & 1 & -1 & 0 & 1 & 0 & 0 \\ 1 & -1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & -1 & 0 & 1 & 0 & -1 & 0 \\ 0 & 0 & 0 & 0 & 0 & -1 & 1 & -1 \\ 0 & 0 & 0 & 1 & -1 & 0 & 0 & 1 \end{bmatrix}$$