Assignment-3

The due date for submitting this assignment has passed.

Due on 2021-02-10, 23:59 IST.

As per our records you have not submitted this assignment.

1) Consider a matrix of size 2×5. The Rank+Nullity of this matrix equals *1 point*

- 2
- 5
- 7
- 3

No, the answer is incorrect.
Score: 0
Accepted Answers:
5

2) Consider the vectors below *1 point*

$$\vec{\mathbf{x}}_1 = \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}, \vec{\mathbf{x}}_2 = \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \end{bmatrix}$$

Using the Gram-Schmidt procedure, a set of orthonormal basis vectors for the same subspace is given as

- $\vec{\mathbf{v}}_1 = \frac{1}{2}\begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}, \vec{\mathbf{v}}_2 = \frac{1}{2\sqrt{5}}\begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \end{bmatrix}$
- $\vec{\mathbf{v}}_1 = \frac{1}{2}\begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}, \vec{\mathbf{v}}_2 = \frac{1}{\sqrt{10}}\begin{bmatrix} -3 \\ 2 \\ 1 \\ -2 \end{bmatrix}$
- $\vec{\mathbf{v}}_1 = \frac{1}{2}\begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}, \vec{\mathbf{v}}_2 = -\frac{1}{2}\begin{bmatrix} 1 \\ -1 \\ -1 \\ 1 \end{bmatrix}$
- $\vec{\mathbf{v}}_1 = \frac{1}{2}\begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}, \vec{\mathbf{v}}_2 = \frac{1}{2\sqrt{5}}\begin{bmatrix} -3 \\ -1 \\ 1 \\ 3 \end{bmatrix}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\vec{\mathbf{v}}_1 = \frac{1}{2}\begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}, \vec{\mathbf{v}}_2 = \frac{1}{2\sqrt{5}}\begin{bmatrix} -3 \\ -1 \\ 1 \\ 3 \end{bmatrix}$

3) Consider the matrix $\mathbf{A}$ given below *1 point*

$$\mathbf{A} = \begin{bmatrix} 1 & 1 & 1 & 1 & 1 \\ 1 & 2 & 3 & 4 & 5 \end{bmatrix}$$

Which of the vectors below lie in the null space of the matrix $\mathbf{A}$?

- $\begin{bmatrix} -3 \\ -1 \\ 2 \\ 1 \\ -1 \end{bmatrix}$
- $\begin{bmatrix} 2 \\ -3 \\ 0 \\ 1 \\ 0 \end{bmatrix}$
- $\begin{bmatrix} 2 \\ -3 \\ -1 \\ 1 \\ 1 \end{bmatrix}$
- $\begin{bmatrix} -2 \\ 3 \\ -2 \\ -1 \\ 2 \end{bmatrix}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\begin{bmatrix} 2 \\ -3 \\ 0 \\ 1 \\ 0 \end{bmatrix}$

4) Kirchoff's voltage law states that *1 point*

- Net voltage drop across a node is zero
- Net current entering a node equals 0
- Net voltage drop across a closed loop is zero
- Net current across a closed loop is zero

No, the answer is incorrect.
Score: 0
Accepted Answers:
Net voltage drop across a closed loop is zero

5) Consider the adjacency matrix $\mathbf{M}$ for a directed graph used to represent a social network as described in the lectures. The elements $[\mathbf{M}]_{i,j}$ are defined as *1 point*

- $[\mathbf{M}]_{i,j} = 1$
- $[\mathbf{M}]_{i,j} = 1$ if there is a directed edge from node i to node j and 0 otherwise
- $[\mathbf{M}]_{i,j} = 1$ if there is a directed edge from node j to node 1 and 0 otherwise
- $[\mathbf{M}]_{i,j} = 1$ if there is a directed edge from node i to node j , or node j to node i, and 0 otherwise

No, the answer is incorrect.
Score: 0
Accepted Answers:
$[\mathbf{M}]_{i,j} = 1$ if there is a directed edge from node i to node j and 0 otherwise

6) Consider the adjacency matrix $\mathbf{M}$ for a directed graph used to represent a social network as described in the lectures. The number of r step connections from node i to node j is given as *1 point*

- $[\mathbf{M}^r]_{i,j}$
- $[r\mathbf{M}]_{i,j} = 1$
- $[\mathbf{M}^{-1}]_{i,j}$
- $[\frac{\mathbf{M}}{r}]_{i,j}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$[\mathbf{M}^r]_{i,j}$

7) Consider the directed graph below *1 point*

The adjacency matrix for this graph is given as

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

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\begin{bmatrix} 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 & 0 \end{bmatrix}$

8) Consider the directed graph below *1 point*

The number of 2-step connections for this graph from node P_1 to node P_5 is given as

- 0
- 1
- 2
- 3

No, the answer is incorrect.
Score: 0
Accepted Answers:
2

9) A dominance directed graph is one in which *1 point*

- Between any pair of nodes P_i, P_j, there is an edge from P_i to P_j or P_j to P_i, or both
- Between any pair of nodes P_i, P_j, there is an edge from P_i to P_j and P_j to P_i
- Between any pair of nodes P_i, P_j, there is an edge from P_i to P_j or P_j to P_i, or none
- Between any pair of nodes P_i, P_j, there is an edge from P_i to P_j or P_j to P_i, but not both

No, the answer is incorrect.
Score: 0
Accepted Answers:
Between any pair of nodes P_i, P_j, there is an edge from P_i to P_j or P_j to P_i, but not both

10) Let $\mathbf{M}$ denote the adjacency matrix of a dominance directed graph. The most influential node is P_i if *1 point*

- Row i has the largest sum in $\mathbf{M}^2$
- Row i has the largest sum in $\mathbf{M}$
- Row i has the largest sum in $\mathbf{M}^2 + \mathbf{M}$
- Row i has the largest sum in $\mathbf{M}^3 + \mathbf{M}^2 + \mathbf{M}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
Row i has the largest sum in $\mathbf{M}^2 + \mathbf{M}$