***Section* 4.3 – Multiplicative Inverses of Matrices**

***Identity Matrix***

The *n x n* identity matrix with 1’s on the main diagonal and 0’s elsewhere and is denoted by

2*x*2 3*x*3 



**The Multiplicative Identity Matrix**



Then 

***Example***

 

***Solution***







**Multiplicative inverse of a matrix**

Multiplicative inverse of a matrix  and  if exists, then:



***Example***

Show that *B* is Multiplicative inverse of *A*.

A =  B = 

***Solution***

***A.B*** =  











∴ *B* is multiplicative inverse of a matrix *A*: 

***Finding Inverse matrix***

To find inverse matrix using Gauss-Jordan method:



**For 2 by 2 matrices** (***only***)







If , then doesn’t exist

***Example***

 ⇒  = ?

***Solution***







***Example***

 ⇒  = ?

***Solution***





To find inverse matrix using Gauss-Jordan method:



***Example***

 Find 

***Solution***

 

 

  





⇒ 

***Example***

 Find 

***Solution***

 

 

 

 

 



⇒ 

**Solving a System Using** ***A-1***

To solve the matrix equation *AX* = *B*.

* ***X***: matrix of the variables
* ***A***: Coefficient matrix
* ***B***: Constant matrix



 *Multiply both side by A-1*

 *Associate property*

 *Multiplicative inverse property*

 *Identity property*

***Example***

Solve the system using 

 Given 

***Solution***





  



***Solution***: {(4, −2, 1)}

***Example***

Use the inverse of the coefficient matrix to solve the linear system



***Solution***

  







The solution of the system is 

***Exercise Section* 4.3 – Multiplicative Inverses of Matrices**

Show that *B* is Multiplicative inverse of *A*

1. 
2. 

Find the inverse, if exists, of

|  |  |  |
| --- | --- | --- |
| 3. *A* = 4. *A* = 5. *A* = 6. *A* = |  |  |

|  |  |
| --- | --- |
|  |  |

State the conditions under which  exists. Then find a formula for 

|  |  |
| --- | --- |
|  |  |

1. Solve the system using *A*-1  Given 
2. Solve the system using 



1. Write the linear system as a matrix equation in the form *AX= B*
2. Solve the system using the inverse that is given for the coefficient matrix



1. Solve the system using 



1. Write the linear system as a matrix equation in the form 
2. Solve the system using the inverse that is given for the coefficient matrix



**(47− 75**) Use the ***inverse*** of the coefficient matrix to solve the linear system

|  |  |  |
| --- | --- | --- |
|  |  |  |