

Unit 4.6: Inverse Matrices + Systems of Equations  
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Identity Matrix - square matrix that when mult. by another matrix = the same matrix

$8 \cdot 1 = 8$

2x2 Identity Matrix

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

3x3 Identity Matrix

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

Inverses -  $[A]^{-1}$  enter

$[A]^{-1} \cdot [A] = I$

$8 \cdot \left(\frac{1}{8}\right) = 1$

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Ex #1a)  $A = \begin{bmatrix} -4 & 2 \\ -2 & 1 \end{bmatrix}$   $B = \begin{bmatrix} 1/4 & -1/2 \\ 1/2 & -1 \end{bmatrix}$

$[A]^{-1} \neq [B]$  Not inverses

1b)

$A = \begin{bmatrix} 3 & -5 \\ -2 & 6 \end{bmatrix}$   
 $[A]^{-1}$  Enter

$G = \begin{bmatrix} 3/4 & 5/8 \\ 1/4 & 3/8 \end{bmatrix}$

$\begin{bmatrix} 0.75 & 0.625 \\ 0.25 & 0.375 \end{bmatrix}$  Math 1: Frac Enter  
 Ans → Frac Enter

$PA = I$  YES

Ex #2a)  $P = \begin{bmatrix} 7 & -5 \\ 2 & -1 \end{bmatrix}$

$\begin{vmatrix} 7 & -5 \\ 2 & -1 \end{vmatrix} = 7(-1) - 2(-5)$

$= -7 - (-10) = -7 + 10 = 3 \neq 0$  Inverse exists

$[A]^{-1}$  Enter  $\begin{bmatrix} -1/3 & 5/3 \\ -2/3 & 1/3 \end{bmatrix}$  Math 1: Frac Enter  
 Ans → Frac Enter

b)

$Q = \begin{bmatrix} -8 & -6 \\ 12 & 9 \end{bmatrix} = \begin{vmatrix} -8 & -6 \\ 12 & 9 \end{vmatrix} = (-8)(9) - (12)(-6)$

$= -72 - (-72) = 0$  Inverse exists

Ex #3:  $X + Y = 24.2$

$3.75X + 3.5Y = 88.05$

$A = \begin{bmatrix} 1 & 1 \\ 3.75 & 3.5 \end{bmatrix}$   $B = \begin{bmatrix} 24.2 \\ 88.05 \end{bmatrix}$

2nd [Q] 2nd [Matrix] Enter

$[A]^{-1} * [B]$  Enter  
 $X = 13.4$   
 $Y = 10.8$  (13.4, 10.8)

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$[A]^{-1} \neq [B]$  → Not inverses.

1b)

$A = \begin{bmatrix} 3 & -5 \\ -2 & 6 \end{bmatrix}$

$G = \begin{bmatrix} 3/4 & 5/8 \\ 1/4 & 3/8 \end{bmatrix}$

$[A]^{-1}$  [Enter]

$\begin{bmatrix} 0.75 & 0.625 \\ 0.25 & 0.375 \end{bmatrix}$

MATH 1: Frac [Enter]

Ans → Frac [Enter]

$AF = GF = I$  YES

Ex #2a)

$P = \begin{bmatrix} 7 & -5 \\ 2 & -1 \end{bmatrix}$

$\begin{vmatrix} 7 & -5 \\ 2 & -1 \end{vmatrix} = 7(-1) - 2(-5) = -7 + 10 = 3 \neq 0$

$[A]^{-1}$  [Enter]

$\begin{bmatrix} -1/3 & 5/3 \\ -2/3 & 1/3 \end{bmatrix}$

MATH 1: Frac [Enter]

Ans → Frac [Enter]

$3 \neq 0$  Invers exists

b)

$Q = \begin{bmatrix} -8 & -6 \\ 12 & 9 \end{bmatrix}$

$\begin{vmatrix} -8 & -6 \\ 12 & 9 \end{vmatrix} = (-8)(9) - (12)(-6) = -72 + 72 = 0$

$0 =$  No inverse exists

Ex #3:  $x + y = 24.2$

$3.75x + 3.5y = 88.05$

$A = \begin{bmatrix} 1 & 1 \\ 3.75 & 3.5 \end{bmatrix}$

$B = \begin{bmatrix} 24.2 \\ 88.05 \end{bmatrix}$

2nd [Quot] 2nd [Matrix] [Enter]

$[A]^{-1} * [B]$

[Enter]

$x = \begin{bmatrix} 13.4 \\ 10.8 \end{bmatrix}$

$(13.4, 10.8)$