Example 1: Find each matrix product, if possible, and state the order of the result.

A) $\begin{bmatrix} 3 & 4 \\ -2 & 5 \end{bmatrix}\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} =$

B) $\begin{bmatrix} 6 & 2 & 0 \\ 3 & -1 & 2 \\ 1 & 4 & 6 \end{bmatrix}\begin{bmatrix} 1 \\ 2 \\ -3 \end{bmatrix} =$

C) $\begin{bmatrix} -2 & 1 \\ 1 & -3 \\ 1 & 4 \end{bmatrix}\begin{bmatrix} -2 & 3 & 1 & 4 \\ 0 & 1 & -1 & 2 \\ 2 & -1 & 0 & 1 \end{bmatrix} =$

D) $\begin{bmatrix} 10 \\ 12 \end{bmatrix}\begin{bmatrix} 6 & -2 & 1 & 6 \end{bmatrix} =$

E) $\begin{bmatrix} 1 & -2 & -3 \end{bmatrix}\begin{bmatrix} 2 \\ -1 \\ 1 \end{bmatrix} =$

F) $\begin{bmatrix} 2 \\ -1 \\ 1 \end{bmatrix}\begin{bmatrix} 1 & -2 & -3 \end{bmatrix} =$

Definition of Identity Matrix

The *n x n* matrix that consists of 1's on its main diagonal and 0's everywhere else is called the ***identity matrix of order n x n*** and is denoted by

$$I_n = \begin{bmatrix} 1 & 0 & 0 & \cdots & 0 \\ 0 & 1 & 0 & \cdots & 0 \\ 0 & 0 & 1 & \cdots & 0 \\ \vdots & \vdots & \vdots & & \vdots \\ 0 & 0 & 0 & \cdots & 1 \end{bmatrix}$$

If A is an $n \times n$ matrix, then

$AI_n = A$ and $I_n A = A$.

The identity matrix is always an **n x n** square matrix.

Example 2: Write this system as a matrix equation, AX=B. Then, use Gauss-Jordan elimination on the augmented matrix [A:B] to solve for the matrix X.

$$\begin{cases} x_1 + x_2 - 3x_3 = -1 \\ -x_1 + 2x_2 = 1 \\ x_1 - x_2 + x_3 = 2 \end{cases}$$

Example 3: A fruit grower raises two crops, which are shipped to three outlets. The list shows how many units of each crop are shipped to each outlet.

	Outlet 1	Outlet 2	Outlet 3
Crop 1	100	75	75
Crop 2	120	150	100

The profit per unit for Crop 1 is \$3.75 and the profit per unit for Crop 2 is \$7.00. find the profits for each of the outlets.

Homework: pages 596-598 #57-67 odd, 73, 79-85 odd, 94