Score:

Name: Solutions
Period (circle one): 1 2 3 4 5 6
Team (circle one): a b c d e f

SM 261 – Matrix Algebra – Quiz 11
Section 2.1 –Matrix Operations

1. Suppose $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $AB = \begin{bmatrix} 5 & 11 \\ 11 & 25 \end{bmatrix}$. What is matrix B?

Two Ways to Solve Problem

(1) Let $B = \begin{bmatrix} a & c \\ b & d \end{bmatrix} \Rightarrow AB = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}\begin{bmatrix} a & c \\ b & d \end{bmatrix} = \begin{bmatrix} 5 & 11 \\ 11 & 25 \end{bmatrix}$

$\Rightarrow$ $a+2b=5$ $\quad c+2d=11$

$3a+4b=11 \Rightarrow R2-3R1$ $\quad 3c+4d=25 \Rightarrow R2-3R1$

$\Rightarrow$ $-2b=-4$ $\quad -2d=-8$

$\Rightarrow$ $b=2 \Rightarrow a=1$ $\quad d=4 \Rightarrow c=3$

$\Rightarrow \boxed{B = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}}$

(2) $B = (A^{-1})(AB) \Rightarrow A^{-1} = -\frac{1}{2}\begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix} = \begin{bmatrix} -2 & 1 \\ 3/2 & -1/2 \end{bmatrix}$

$\Rightarrow \begin{bmatrix} -2 & 1 \\ 3/2 & -1/2 \end{bmatrix}\begin{bmatrix} 5 & 11 \\ 11 & 25 \end{bmatrix} = \begin{bmatrix} -10+11 & -22+25 \\ 15/2-11/2 & 33/2-25/2 \end{bmatrix}$

$\Rightarrow \boxed{B = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}}$