(2b) Let $A=\begin{bmatrix} a & b \\ c & d \\ e & f \end{bmatrix}$, $D=\begin{bmatrix} m & 0 \\ 0 & n \end{bmatrix}$, $B=\begin{bmatrix} s & t & u & v \\ w & x & y & z \end{bmatrix}$

ADB $E=\begin{bmatrix} a & b \\ c & d \\ e & f \end{bmatrix}\begin{bmatrix} m & 0 \\ 0 & n \end{bmatrix}\begin{bmatrix} s & t & u & v \\ w & x & y & z \end{bmatrix}$

$=\begin{bmatrix} am & bn \\ cm & dn \\ em & fn \end{bmatrix}\begin{bmatrix} s & t & u & v \\ w & x & y & z \end{bmatrix}$

$=\begin{bmatrix} ams+bnw & amt+bnx & amu+bny & amv+fnz \\ cms+dnw & cmt+dnx & cmu+dny & cmv+dnz \\ ems+fnw & emt+fnx & emu+fny & emv+fnz \end{bmatrix}$

$\sum_{i=1}^{2} d_{ii}a_i b_i^T$ $(a_1\ d_{11}\ b_1^T)+(a_2\ d_{22}\ b_2^T)$

$=\left(\begin{bmatrix} a \\ e \end{bmatrix} m \begin{bmatrix} s & t & u & v \end{bmatrix}\right) + \left(\begin{bmatrix} b \\ f \end{bmatrix} n \begin{bmatrix} w & x & y & z \end{bmatrix}\right)$

$=\left(\begin{bmatrix} am \\ cm \\ em \end{bmatrix}\begin{bmatrix} s & t & u & v \end{bmatrix}\right)+\left(\begin{bmatrix} bn \\ fn \\ fn \end{bmatrix}\begin{bmatrix} w & x & y & z \end{bmatrix}\right)$

$=\begin{bmatrix} ams+bnw & amt+bnx & amu+bny & amv+fnz \\ cms+dnw & cmt+dnx & cmu+dny & cmv+dnz \\ ems+fnw & emt+fnx & emu+fny & emv+fnz \end{bmatrix}$ $=$

Thus, $E=ADB=\sum_{i=1}^{2} d_{ii}a_i b_i^T$ holds true