Math 235 HW #2

Section 1.3 # ~~8~~ 7, 10, 22a, 35, 38

1.3 #8

$$C = \begin{bmatrix} 2 & -1 \\ 0 & 6 \\ -3 & 2 \end{bmatrix} \quad D = \begin{bmatrix} -4 & 2 \\ 3 & 5 \\ -1 & -3 \end{bmatrix}$$

$CD = \begin{bmatrix} \ \end{bmatrix}$ CD is undefined, since this is $\boxed{\text{wrong problem!}}$

$$(3\times 2)\cdot(3\times 2)$$

$$\neq$$

so $(CD)^T$ is undefined.

1.3 #10

$$B = \begin{bmatrix} 4 & 1 & -2 \\ 5 & -1 & 3 \end{bmatrix}$$

$$(5D)(4B) = 20DB = 20\begin{bmatrix} -4 & 2 \\ 3 & 5 \\ -1 & -3 \end{bmatrix}\begin{bmatrix} 4 & 1 & -2 \\ 5 & -1 & 3 \end{bmatrix} = 20\begin{bmatrix} -6 & -6 & 14 \\ 37 & -2 & 9 \\ -19 & 3 & -6 \end{bmatrix}$$

$$= \begin{bmatrix} -120 & -120 & 280 \\ 740 & -40 & 180 \\ -380 & 60 & -120 \end{bmatrix}$$

1.3 #22a

Thm If $\vec{x}$ is a rowvector and A is a matrix, then $\vec{x}A$ is a row vector.

Pf Since $\vec{x}$ is a row vector we have $\vec{x}$ is $1\times n$ for some n.

To multiply $\vec{x}A$ we must have A be $n\times m$.

Then $\vec{x}A$ will be $1\times m$, which is a row vector.

1.3 #35 B is $m\times n$, $B = A^T$

a) so A is $n \times m$

b) $AA^T = AB$ is $(n\times m)\cdot(m\times n)$

so AA^T is $n\times n$.

c) $A^T A = BA$ is $(m\times n)\cdot(n\times m)$

so $A^T A$ is $m\times m$.

1.3 #38 Thm If A is a square matrix, then $A + A^T$ is symmetric.

Pf $A + A^T$ is symmetric means $(A+A^T)^T = A + A^T$,
so that's what we'll prove:

$$(A+A^T)^T = A^T + A^{TT} = A^T + A = A + A^T$$ shown.

1.3 #7 AB is not defined, since this is $(2\times 3)\cdot(2\times 3)$
and these are not equal.