Answer on Question #38450, Math, Matrix

There must be some mistake in the task. Plugging in any real matrix M, and explicitly evaluating trace does not match any of a), b), c), d) answers.

$$N=\begin{pmatrix}3 & -4 & 0\\ 4 & 3 & 0\\ 0 & 0 & 1\end{pmatrix} .$$

For example, let $M=\begin{pmatrix}-1 & 0 & 2\\ 1 & 2 & 3\\ 1 & 1 & 1\end{pmatrix}$, so $NMN^T=\begin{pmatrix}11 & -52 & -6\\ -27 & 14 & 17\\ -1 & 7 & 1\end{pmatrix}$ and $tr(NMN^T)=26$. Then,

a) $tr\,M=2$

b) $2tr(N)+tr(M)=2\cdot 7+2=16$

c) $(tr(N))^2\cdot tr(M)=49\cdot 2=98$

d) $(tr(N))^2+tr(M)=49+2=51$

Thus, none of variants matches.

For any matrix M, it might be calculated that $tr(NMN^T)=tr(N^TNM)=25(M_{11}+M_{22})+M_{33}$.