

Given $P \in M_{n \times m}$ & $Q \in M_{m \times n}$

$$m < n$$

$$\Rightarrow (PQ)_{n \times n} \text{ \& } (QP)_{m \times m}$$

Since $m < n$

$$\Rightarrow \text{Rank}(PQ) \leq m \text{ \& } \text{Rank}(QP) \leq m$$

$$\Rightarrow \underline{\text{here}} \text{ Rank}(PQ) \neq n$$

$$\text{ \& Rank}(QP) \neq \left\lfloor \frac{m+n}{2} \right\rfloor$$

so option (a), (d) are correct
