Question 1 *(Many points)*

Let A be an $n \times m$ matrix, B an $m \times p$ matrix, C a $p \times n$ matrix and suppose $n < m < p$. Circle those expressions below that are well defined:

- $\det A$ No (only well defined for square matrices)
- BA No
- ABC Yes (Recall matrix dimensions must agree)
- ACB No
- $\det(AA^{\mathrm{T}})$ Yes (AA^{T} is always square)
- $3A$ Yes
- $\exp A$ No (only well defined for square matrices)
- $\exp(B^{\mathrm{T}}B)$ Yes
- $\det(ABC)$ Yes
- $A - B$ No
- $B - A$ No
- C^{-1} No
- $A \sim B$ & $B \sim C \Rightarrow A \sim C$ Free point!
- CBA No
- BC Yes
- CB No
- $A = B$ No
- $\frac{dA}{dx}$ Yes
- $A \cdot B$ No
- $\mathrm{adj}A$ No (again, only well defined for square matrices)