For 1-4, Circle the correct product. Provide a mechanism that explains your choice.

1) \[
\text{Br} - \text{OMe} \quad \text{NaOMe} \quad \rightarrow \quad \text{OMe} - \text{Br}
\]
allylic position is more reactive
reaction proceeds with inversion

2) \[
\text{O} \quad \text{NaOMe} \quad \rightarrow \quad \text{OH} - \text{OMe}
\]
1° position is more reactive

3) \[
\text{HO} \quad \text{Br} \quad \text{NaH} \quad \rightarrow \quad \text{OEt}
\]

4) \[
\text{TsO} - \text{OH} \quad \text{NaH} \quad \rightarrow \quad \text{OEt}
\]

5) Provide a mechanism
\[
\text{O} \quad \text{Br} \quad \text{NaSMe} \quad \rightarrow \quad \text{O} - \text{SMe}
\]

6) The reaction below is an S_N2 process. However, the absolute configurations of the starting material and products are both R. Explain. (Hint: this is a trick question).

The 'trick' is in the assignments of stereochemistry. In the starting material, sulfur is the group of second highest priority. In the product, the sulfur has the highest priority. The apparent retention of stereochemistry is a result of a priority change, not a change in mechanism.