1. Draw a potential energy diagram for an E1 reaction. (2 points).

2. Show an S_N2 synthesis for the compound below starting using an alkyl halide as the starting material. (Problem 6-46f, 4 points)

\[ \text{Compound} \rightarrow \text{Product} \]

3. Circle the compound below that is most nucleophilic. (2 points)

\[ \text{NH}_3 \quad \text{PH}_3 \quad \text{SH}_2 \]

4. Give the solvolysis product expected when the following compound is heated in ethanol. (2 points)

\[ \text{Structure} \]