1. (6 pts) For each pair, circle which reaction would take place more rapidly. Briefly explain your choice in the space to the right.

(a) \[
\text{Cl} \quad \text{O} \quad \text{EtOH}
\]

(b) \[
\text{Cl} \quad \text{S} \quad \text{EtOH}
\]

(a) \[
\text{O} \quad \text{H} \quad \text{Br}^{-} \quad \text{EtOH}
\]

(b) \[
\text{O} \quad \text{H} \quad \text{Br}^{-} \quad \text{EtOH}
\]

2. (5 pts) Show how you would synthesize the following compound via an S_N2 reaction. You must clearly draw the reactants and a curved arrow mechanism (it is not necessary to draw any transition states).

3. (9 pts) Clearly draw the structure of the expected major substitution product(s) in each of the following reactions.

(a) \[
\text{Br} \quad \text{CH}_{2} \text{CH}_{3}
\]

(b) \[
\text{Cl} \quad \text{Cl} \quad \text{NaOCH}_{3} \quad \text{acetone}
\]

(c) \[
\text{I} \quad \text{H} \quad \text{NaBr} \quad \text{acetone}
\]