Exercise 6: A summary of substitution and elimination reaction of alkyl halides

1. Predict the major product(s) for the following reactions and give the type of reaction (E1, E2, S_N1 or S_N2):

- \( \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Br} \) with \( \text{CH}_3\text{O}^- \) and methanol

- \( \text{H}_3\text{C}-\text{C}-\text{CH}_3\text{Br} \) with \( \text{CH}_3\text{O}^- \) and methanol

- \( \text{H}_3\text{CH}_2\text{C}-\text{CH}_3 \) with \( \text{CH}_3\text{COO}^- \) and acetic acid

- \( \text{H}_3\text{CH}_2\text{C}-\text{OH}_3 \) with \( \text{CH}_3\text{CH}_2\text{O}^- \) and ethanol

- \( \text{H}_3\text{C}-\text{C}-\text{CH}_3 \) with \( \text{CH}_3\text{OH} \)
2. What general statement can you make about all of the reactions above if, instead of being bromides, the molecules were chlorides?

3. Give the reagents/conditions for the following two-step synthesis. Be warned, the second step is an anti-Markovnikov addition.