2. Draw the mechanism and product of the following reaction showing all intermediates and electron-pushing arrows.

2. Show how you would accomplish the following synthesis. Include all isolated intermediate compounds and reagents over the arrows.

3. Give the product(s) of the following reactions showing stereochemistry in 3-dimensions where necessary and all stereoisomers. Indicate for each reaction whether it is O (Oxidation), R (Reduction) or N (Neither).

(a) \chem{\text{CH}_3\text{CH}_2\text{OH}} \xrightarrow{\text{CrO}_3, \text{excess} \H_2\text{SO}_4, \text{H}_2\text{O}} \text{CH}_3\text{CH(OH)}\text{CH}_3

(b) \chem{\text{CH}_3\text{CH}_2\text{CH}_2\text{OTs}} \xrightarrow{\text{NaBr}} \text{CH}_3\text{CH}_2\text{CH}_2\text{SO}_2\text{H}

(c) \chem{\text{PhCH}_2\text{OH}} \xrightarrow{\text{SOCl}_2} \text{PhCH}_2\text{Cl}

(d) \chem{\text{C}_5\text{H}_9\text{OH}} \xrightarrow{\text{PCC}} \text{C}_5\text{H}_9\text{C}=\text{O}