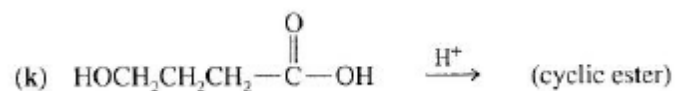
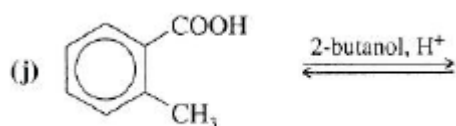
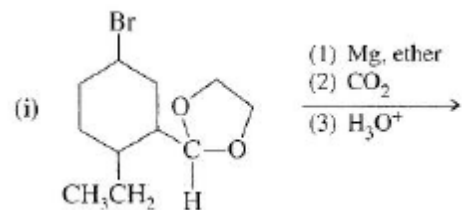
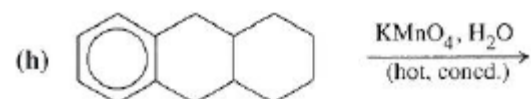
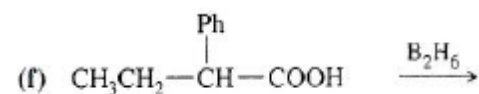
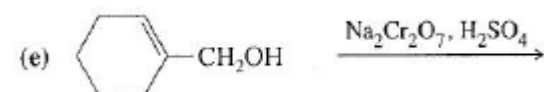
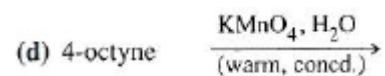
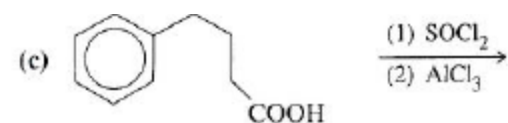
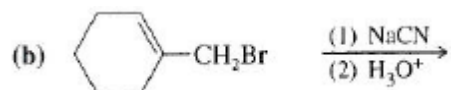
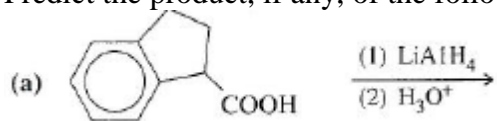


1. Predict the product, if any, of the following reactions.



2. Show how you will accomplish the following synthesis (you can use any necessary reagents).

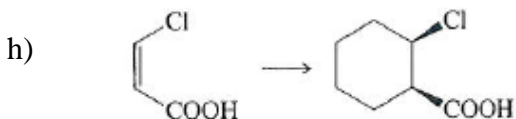
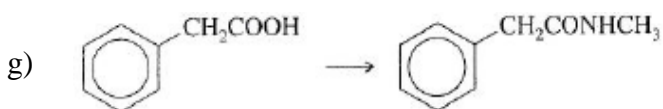
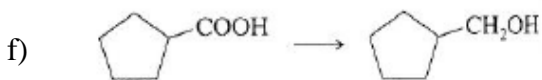
a) Trans-1-bromo-2-butene \longrightarrow trans-3-pentenoic acid (two ways)

b) 3-hexene \longrightarrow propanoic acid

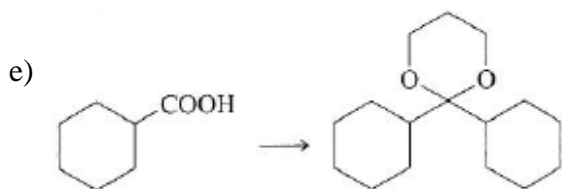
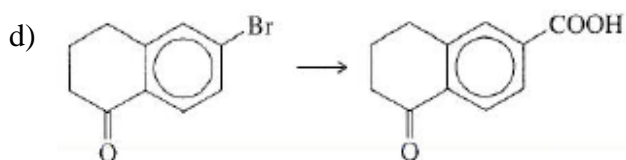
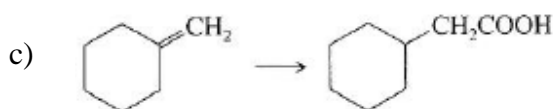
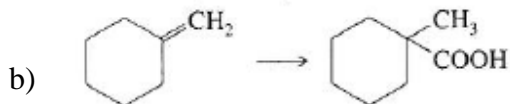
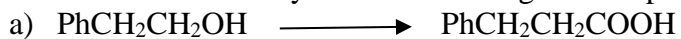
c) 2-butenal \longrightarrow 2-butenoic acid

d) Hexanoic acid \longrightarrow hexanal

e) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{COOH} \longrightarrow \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{COOCH}_3$ (two ways)



3. Show how would carry out the following multistep synthesis.



4. Show how you would use extractions with a separatory funnel to separate a mixture of the following compounds: benzoic acid, phenol, benzyl alcohol and aniline.