Problem 1.(35 points) Give the products for the following reactions. If there is more than 1 step, just give the final product. If no reactions occur, state so.

1)

1) $(CH_3)_2CuLi$ /ether

2) H_3O^+

+ CH_3Cu

2)

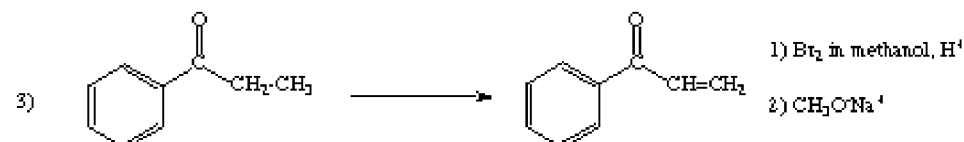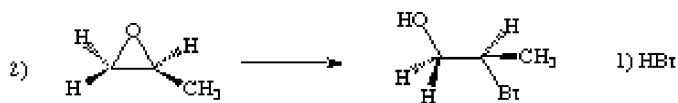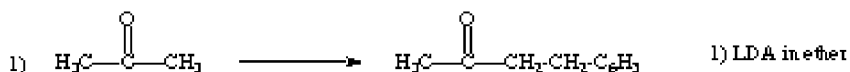Br_2 (excess)

$NaOH, H_2O$

+ $HCBr_3$

3)

1) CH_3CH_2Li / ether

2) H_3O^+

4)

1) $LiAlH_4$ /ether

2) H_3O^+

5)

$CH_3CH_2O^-Na^+$

CH_3CH_2OH

6)

+ H_2N-

CH_3OH

7)

CH_3NH_2

CH_3OH

NHCH$_3$
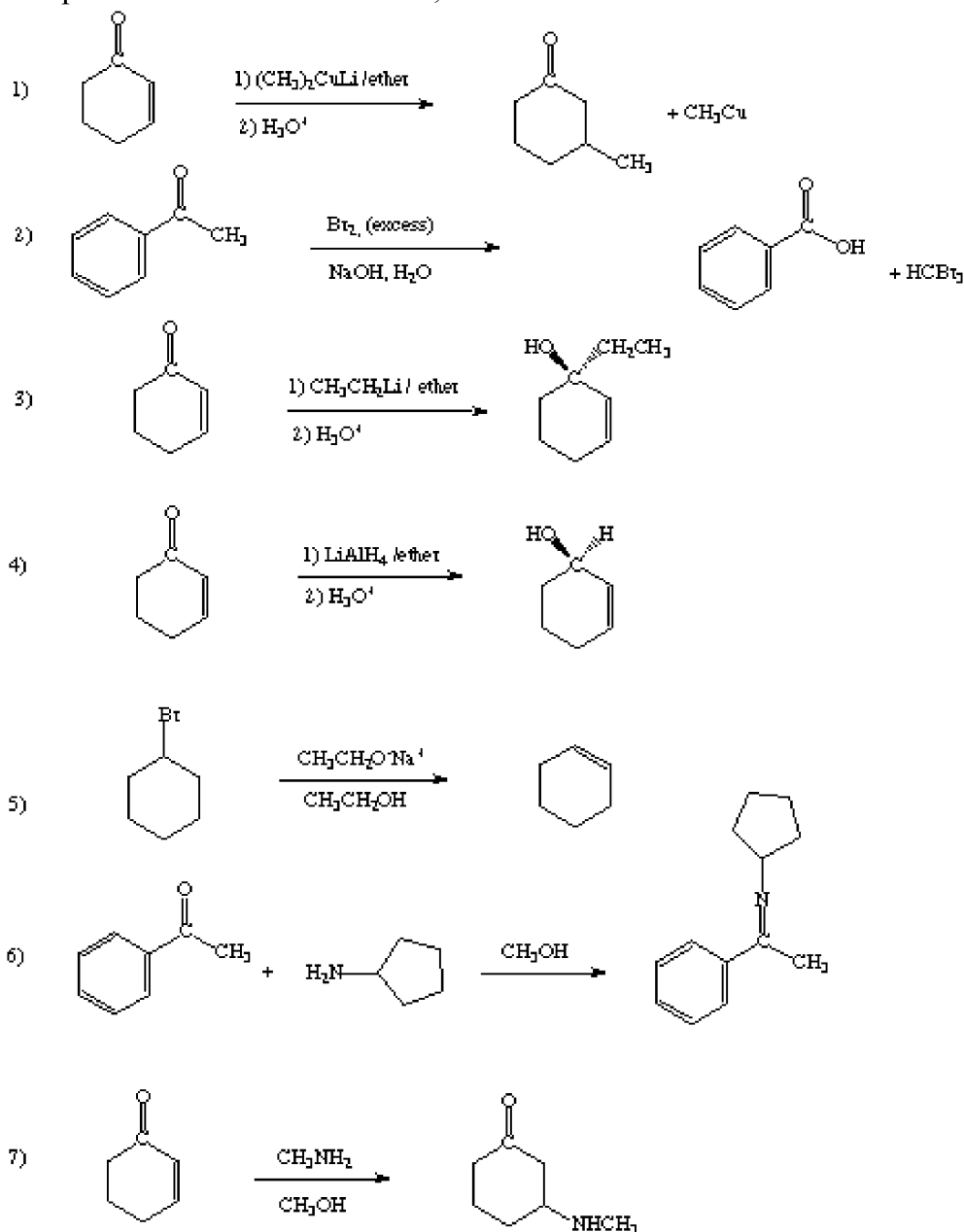
Problem 2. (20 points) What reagents would you use to carry out the following reactions. More than one step may be required. If more than one step is required, number each step. Circle the reagents. Do not give intermediate products. Do not give the synthesis of the reagents.

1) H_3C—C(=O)—CH_3 $\longrightarrow$ H_3C—C(=O)—CH_2-CH_2-C_6H_5

1) LDA in ether

2) $C_6H_5CH_2Br$

2) $\longrightarrow$

1) HBr

3) $\longrightarrow$

1) Br_2 in methanol, H^+

2) $CH_3O^-Na^+$

4) $\longrightarrow$

1) $CH_3O^-Na^+$ in methanol

2) H_3O^+

5) $\longrightarrow$

1) CH_3CO_3H
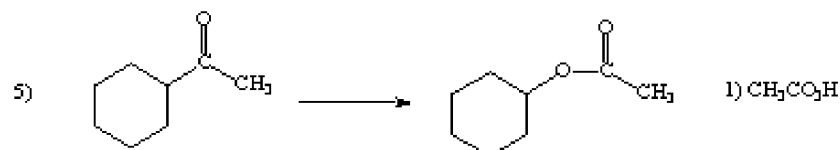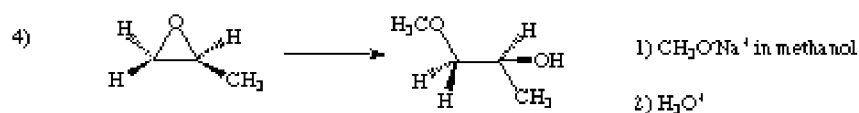
Problem 3. (10 points) How would you carry out the following transformation?

2 x $\longrightarrow$

$K_2Cr_2O_7$
H_2SO_4

NaOH/H_2O
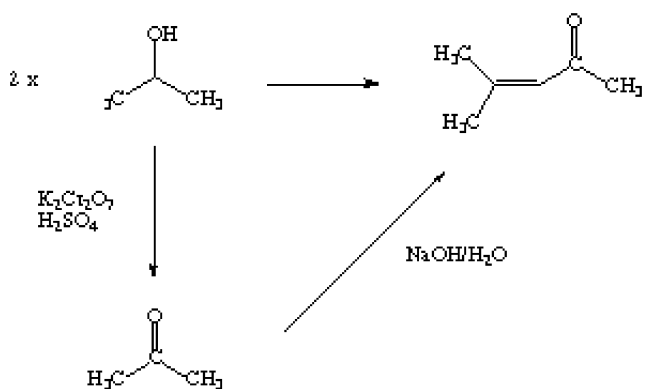
Problem 4. (15 points) Employing Wittig reagent, how would you carry out the following transformation? You must show the synthesis of the Wittig reagent.

2 x

NaBH₄
in methanol

OH OH

OsO₄, peroxide

PBr₃

1)Ph₃P

2) BuLi in ether

Br

=P(Ph)₃
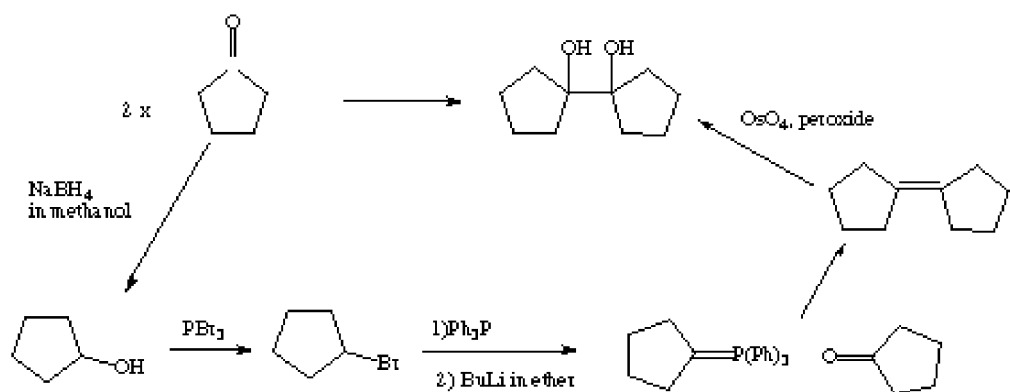
Problem 5. (10 points) What two molecules would you use in the Robinson annulation synthesis of the following molecule. Show only the two molecules – do not show the synthesis.

CH₃

CH₃

CH₃
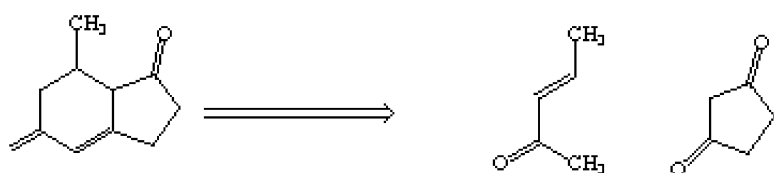
Problem 6 (10 points) Give the mechanism for the following transformation.

HO   H

CH₃

H_3O^+

CH₃
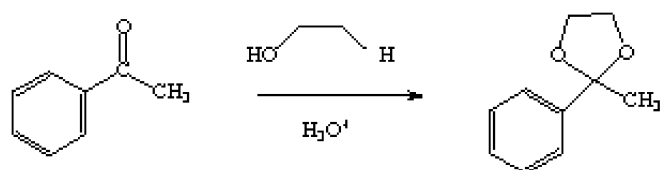
See page 696-697 in text for mechanism for acetal formation