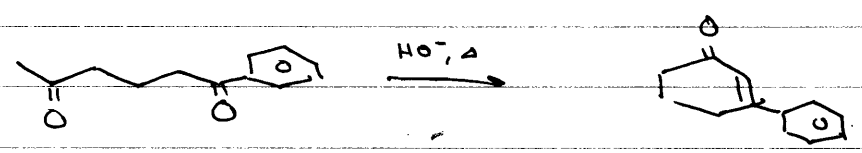
59-331 /333

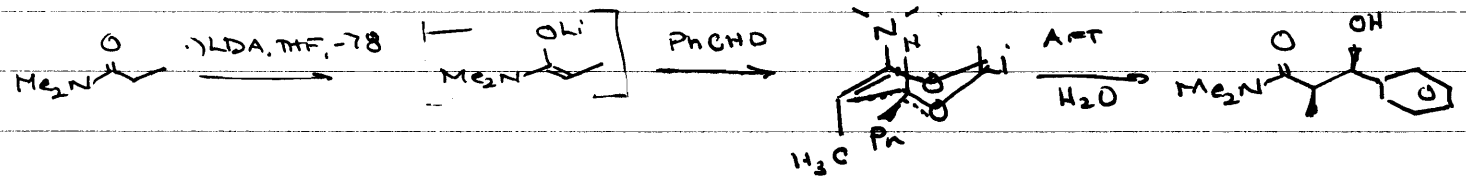
Final Exam - Suggested Solution

W'2013

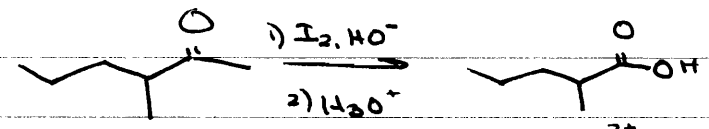
1a)



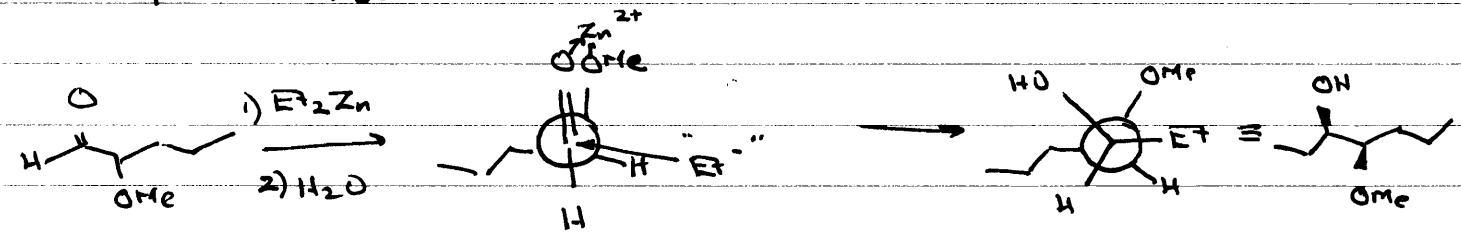
b)



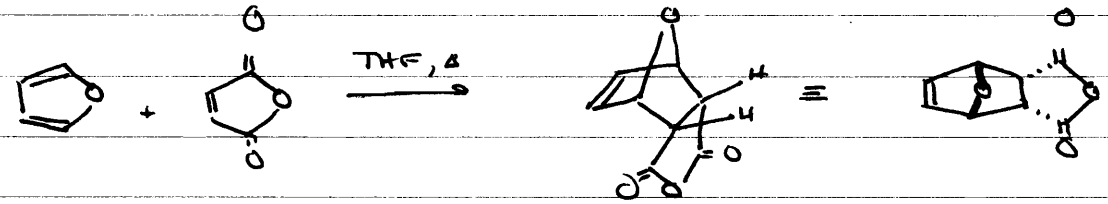
c)



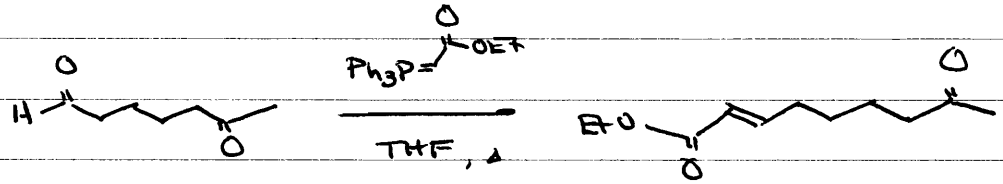
d)



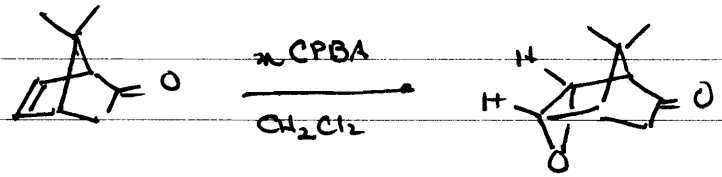
e)



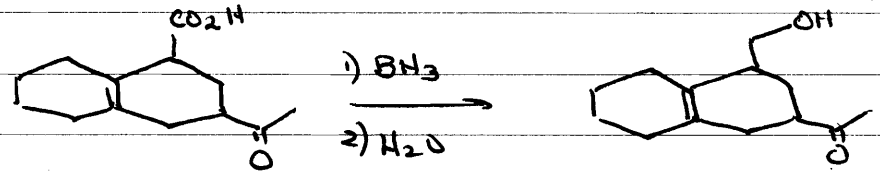
f)



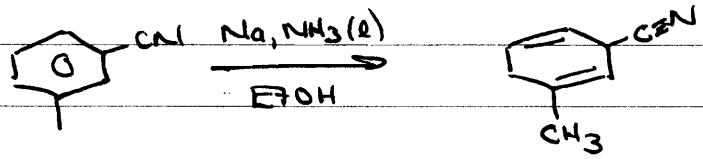
g)



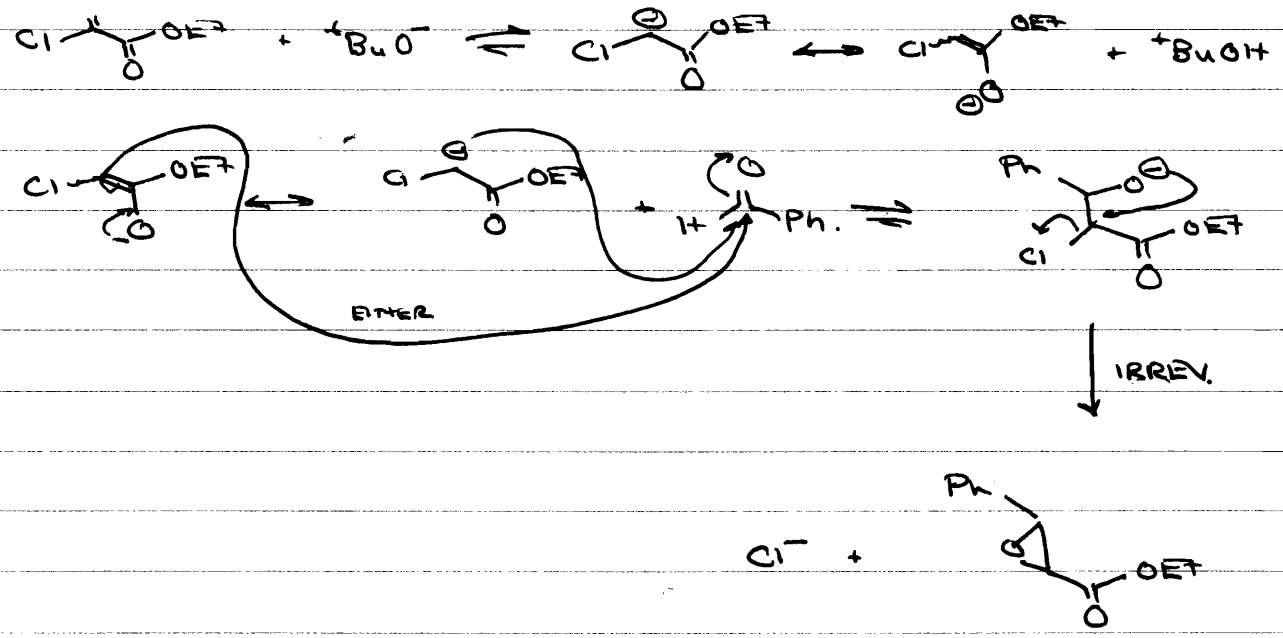
h)



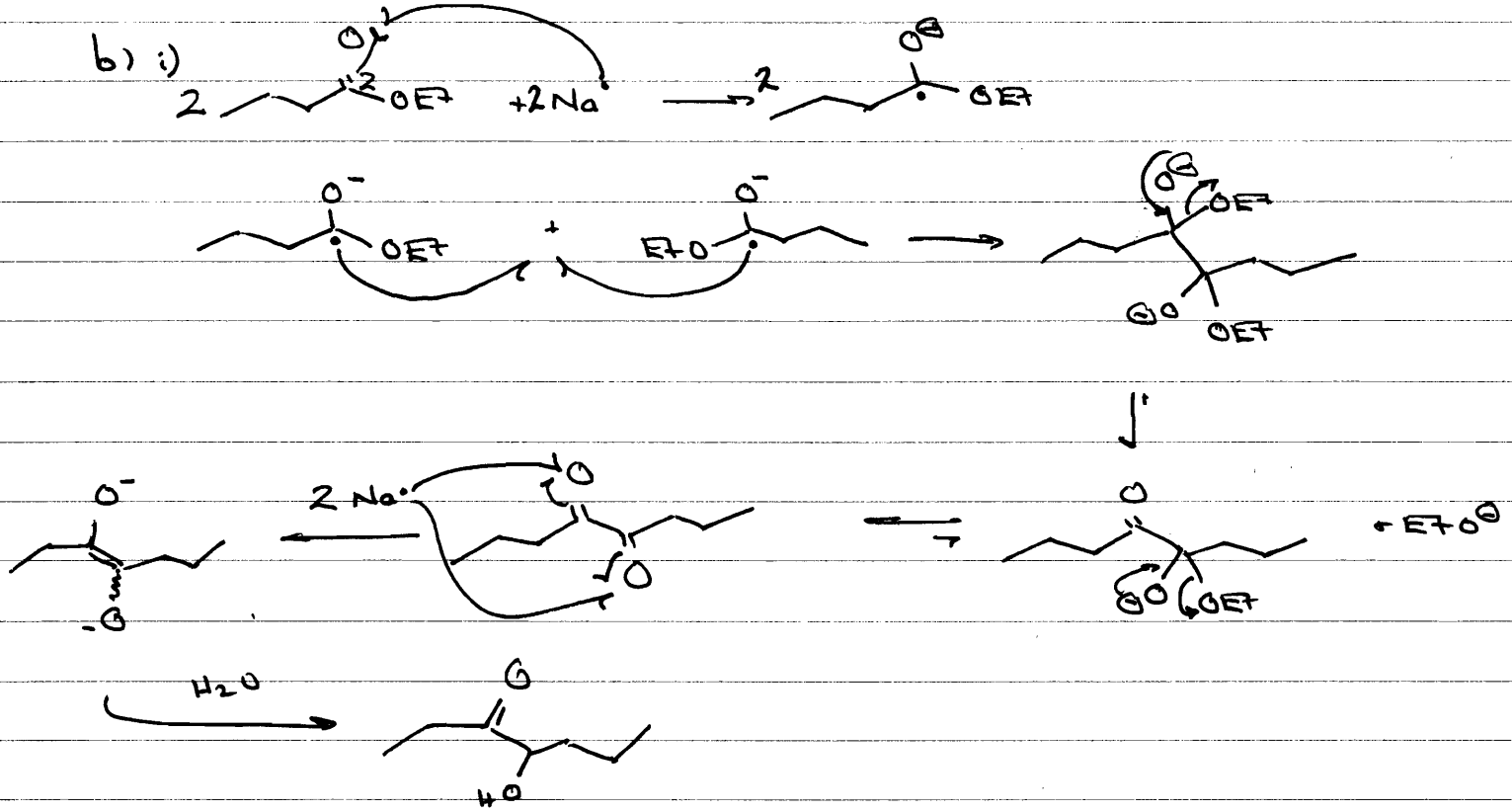
i)



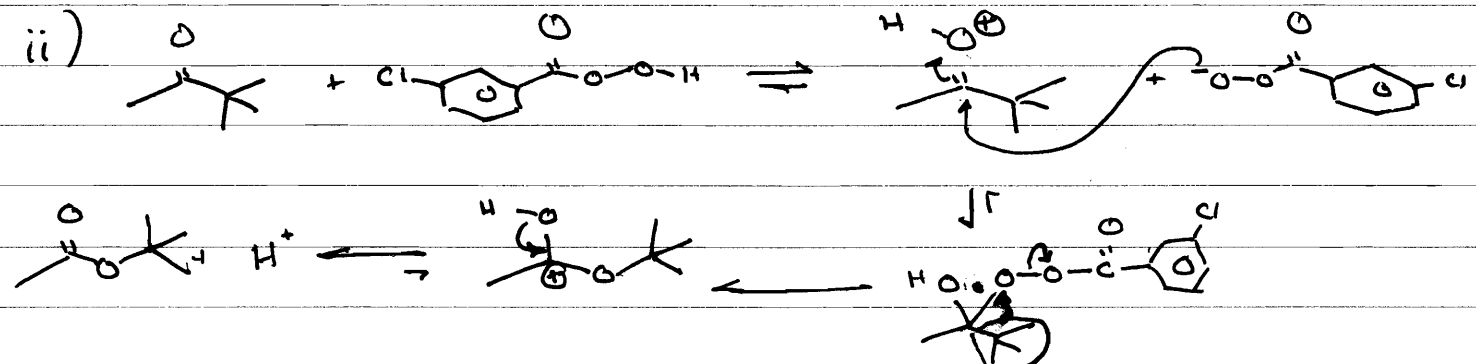
2a)


Cl
OEt
+ tBuO⁻
tBuOH
Ph.
EITHER
IRREV.
Cl⁻
Ph

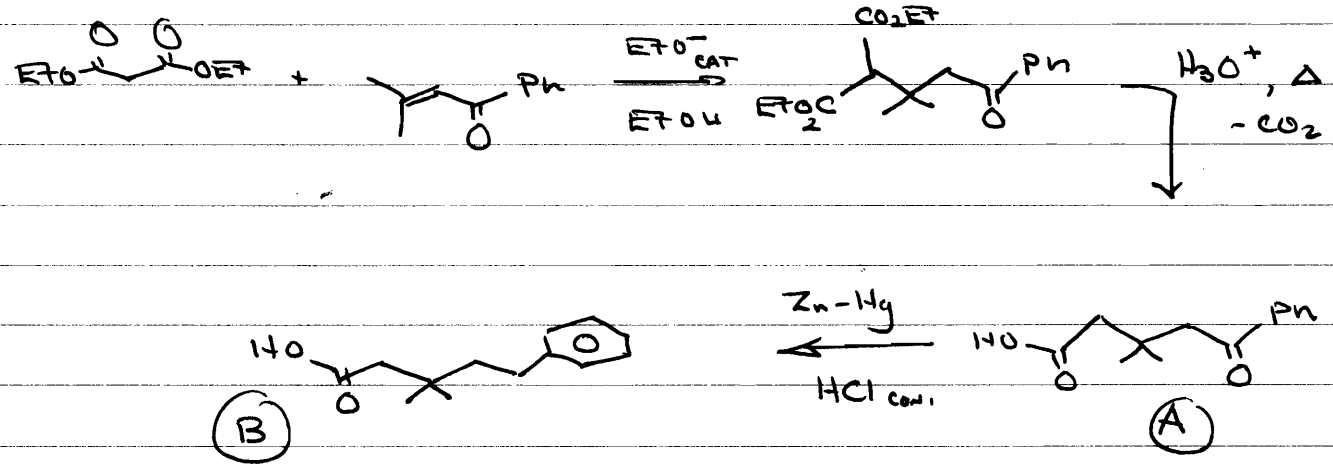
b) i)


2
+2Na
OEt
EtO
2 Na
H₂O
HO

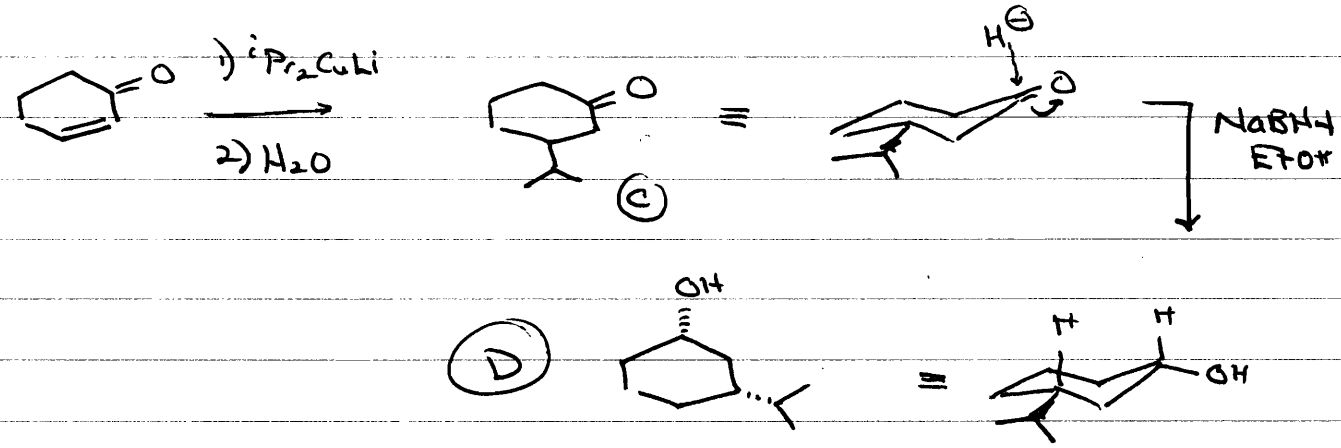
ii)


Cl
H⁺

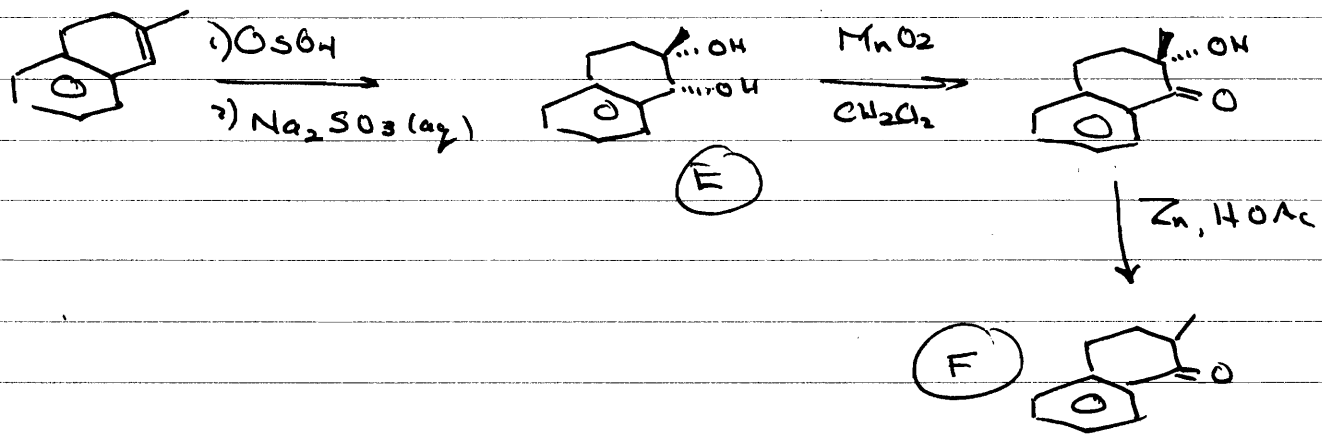
3a)


EtO⁻ cat
EtOH
H_3O^+, Δ
$-CO_2$
Zn-Hg
HCl conc.
B
A

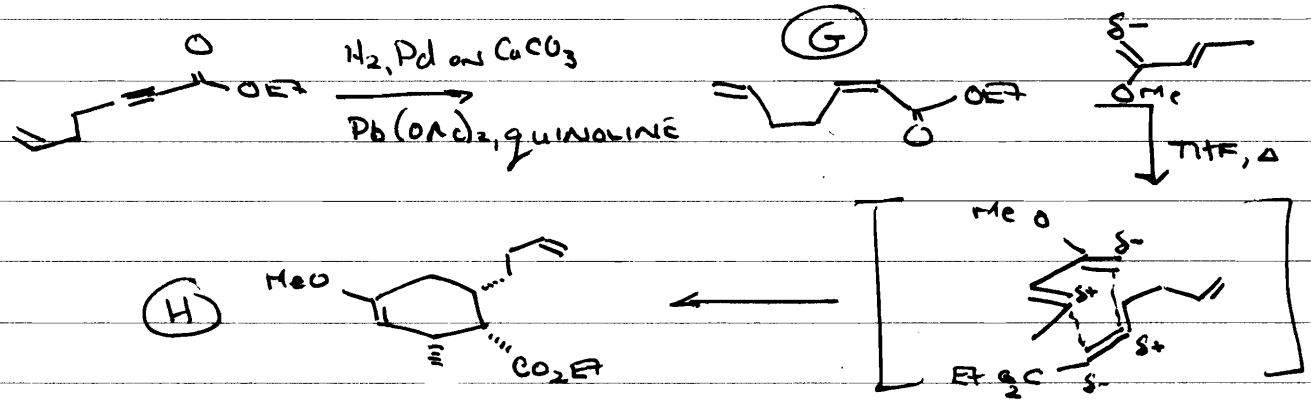
b)


1) $^iPr_2CuLi$
2) H_2O
C
NaBH4
EtOH
D

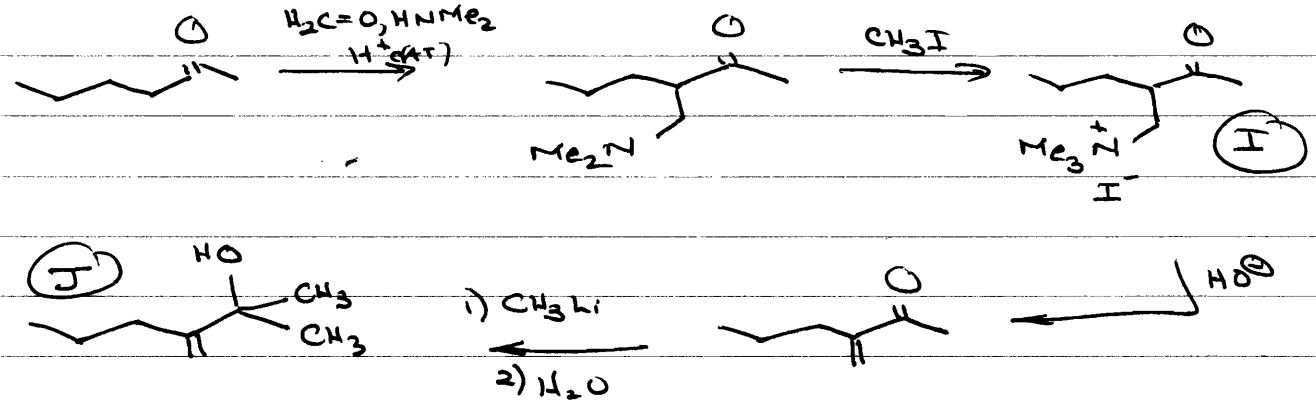
c)


1) OsO4
2) Na_2SO_3 (aq)
E
MnO_2
CH_2Cl_2
Zn, HOAc
F

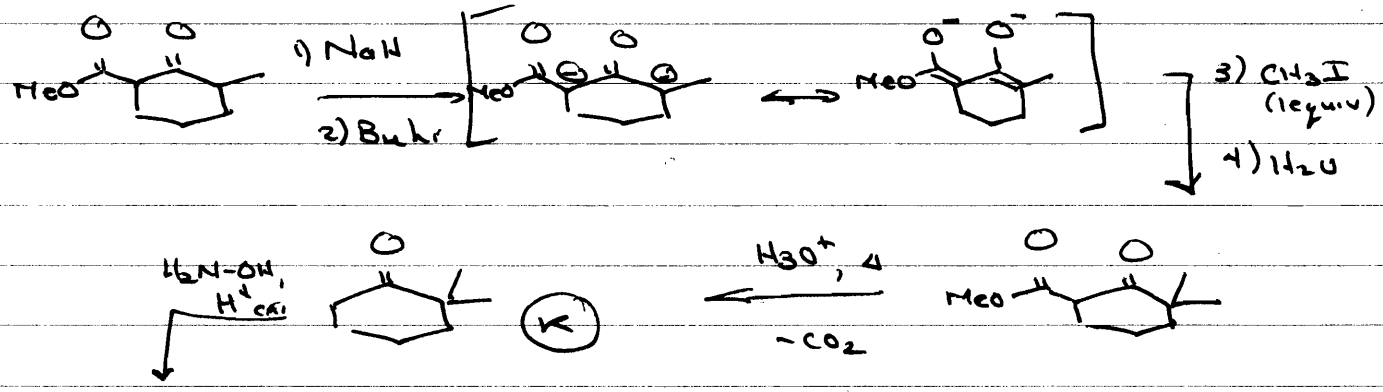
d)


H_2, Pd on $CaCO_3$
$Pb(OAc)_2$, quinoline
G
THF, Δ
H

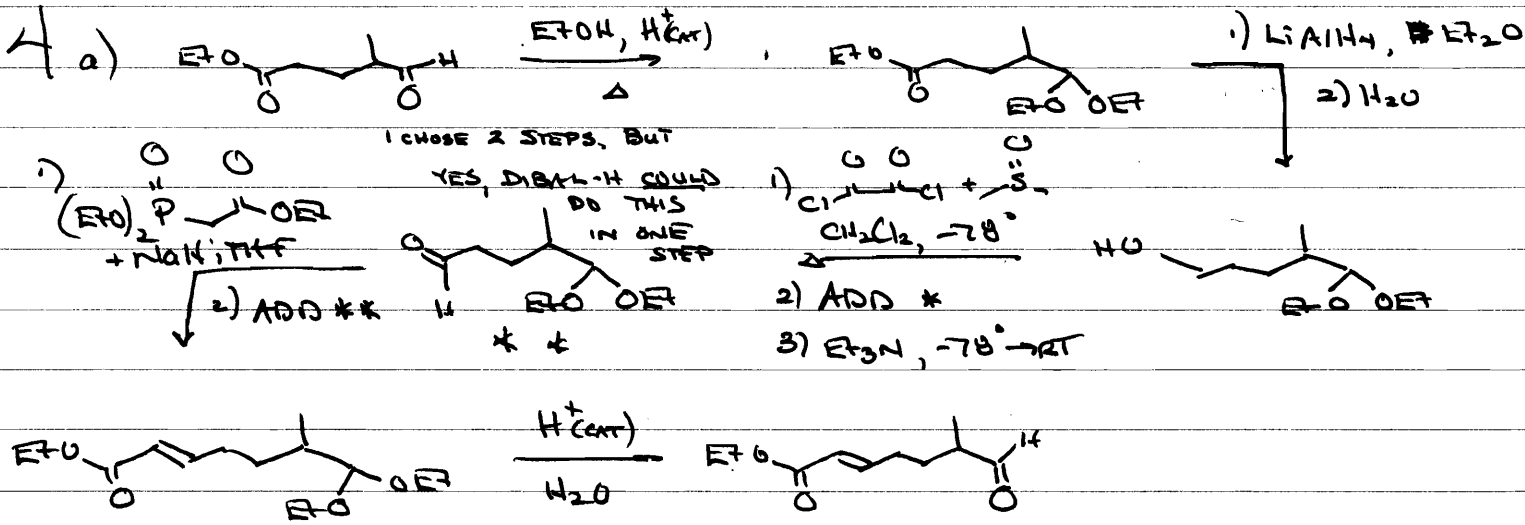
e)


$H_2C=O, HNMe_2$
H^+(cat)
CH_3I
Me_2N
$Me_3\overset{+}{N}$
I^-
I
J
HO
CH_3
CH_3
1) CH_3Li
2) H_2O
$HO^\ominus$

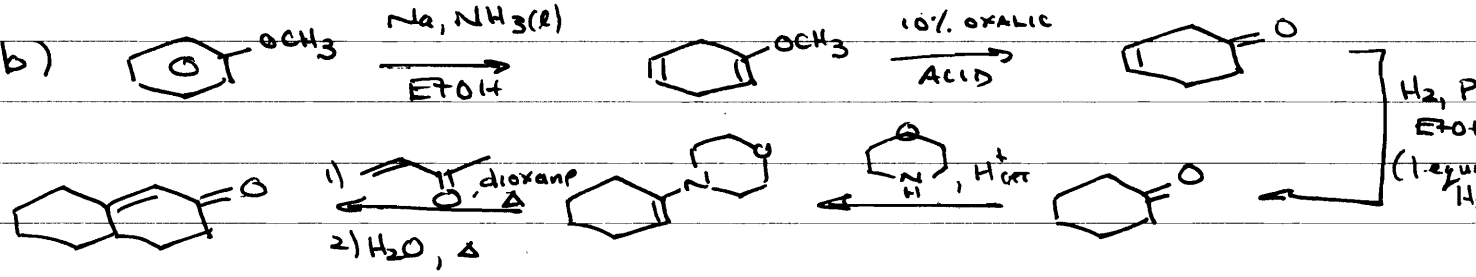
f)


MeO
1) NaH
2) BuLi
3) CH_3I (1 equiv)
4) H_2O
H_2N-OH, H^+ cat
K
H_3O^+, Δ
$-CO_2$
HO
N
1) H_2SO_4
2) H_2O
1) LiAlH4
2) H_2O
L

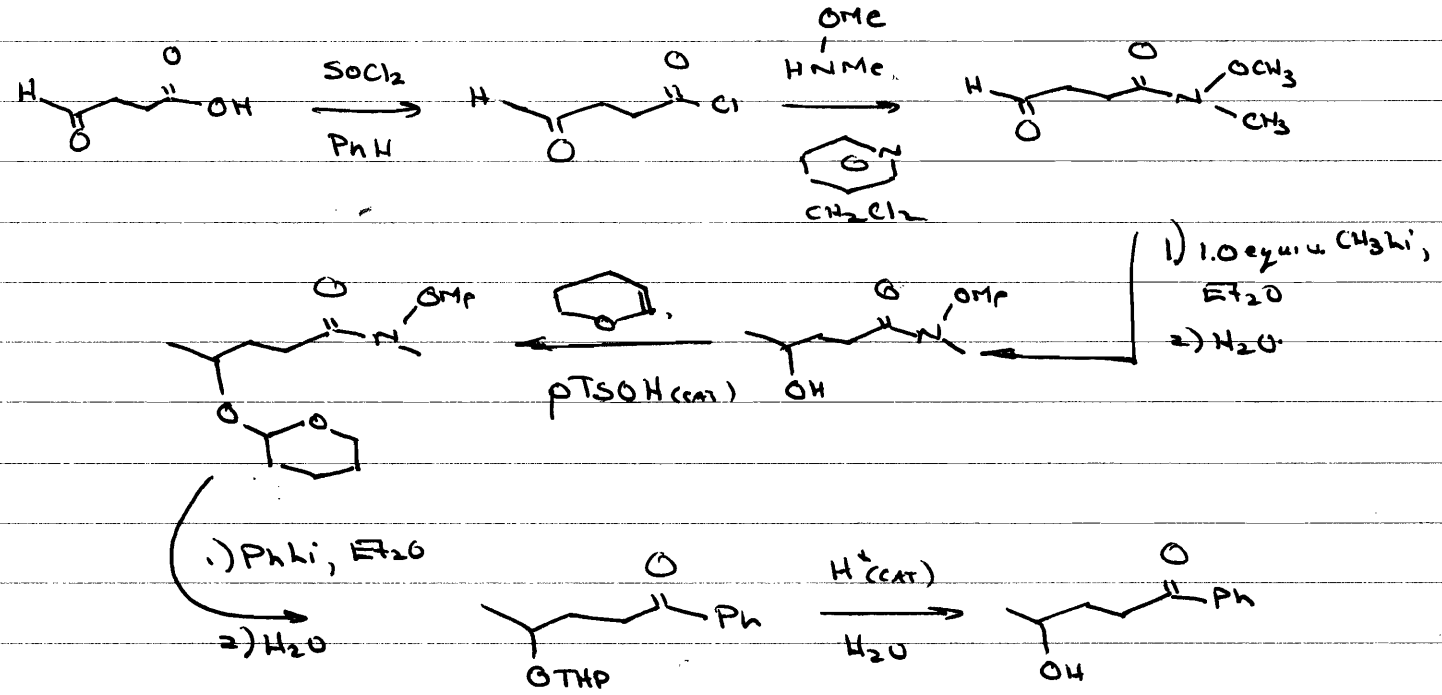
4 a)


EtO
$EtOH$, H^+(cat)
Δ
1) LiAlH4, Et2O
2) H_2O
EtO
OEt
1) $(EtO)_2P$
+ NaH; THF
2) ADD **
I CHOSE 2 STEPS, BUT YES, DIBAL-H COULD DO THIS IN ONE STEP
* *
1)
CH_2Cl_2, −78°
2) ADD *
3) Et_3N, −78° → RT
HO
H^+(cat)
H_2O

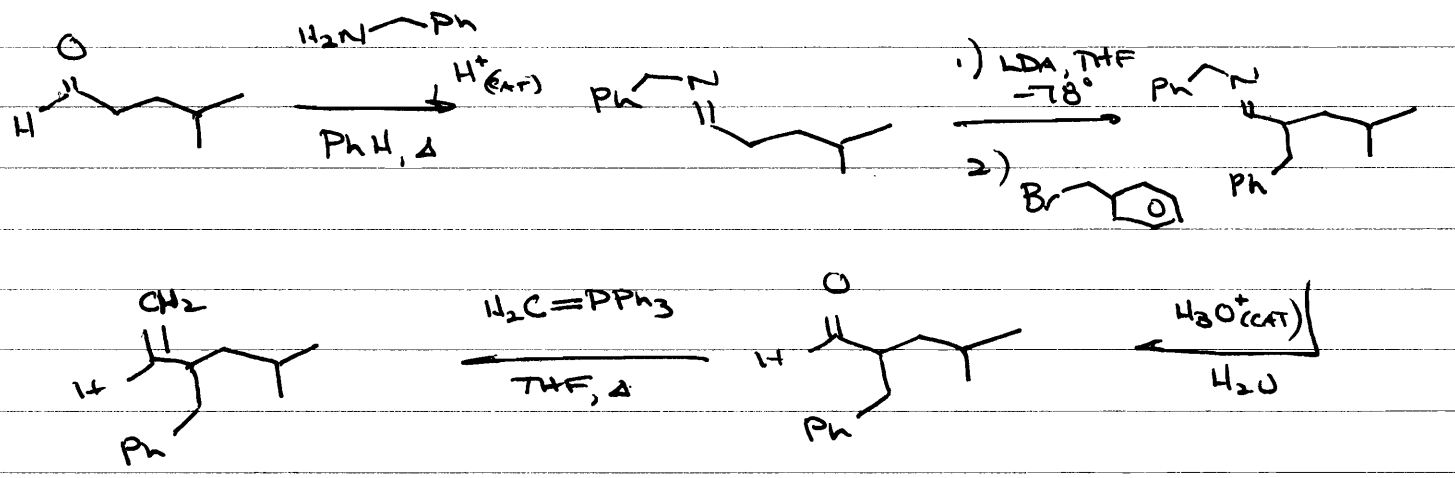
b)


OCH_3
Na, NH_3(l)
EtOH
10% OXALIC ACID
H_2, Pd/C
EtOH
(1 equiv H_2)
1)
dioxane
Δ
2) H_2O, Δ
H^+(cat)

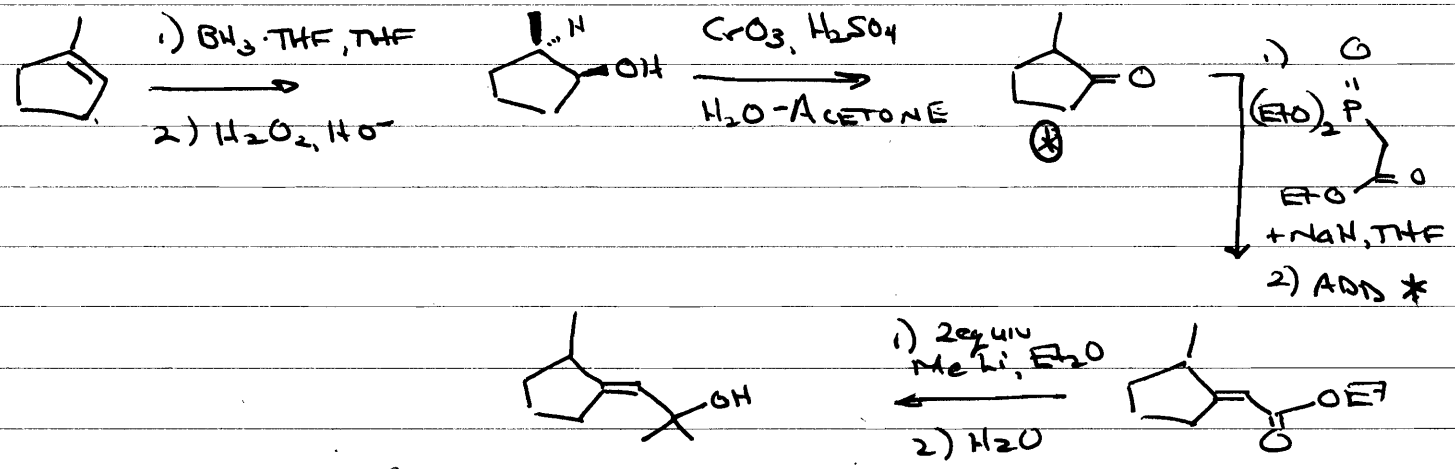
f).


SOCl2
PhH
OMe
HNMe
CH2Cl2
1) 1.0 equiv CH3Li, Et2O
2) H2O
pTSOH (cat)
1) PhLi, Et2O
2) H2O
H+ (cat)
H2O

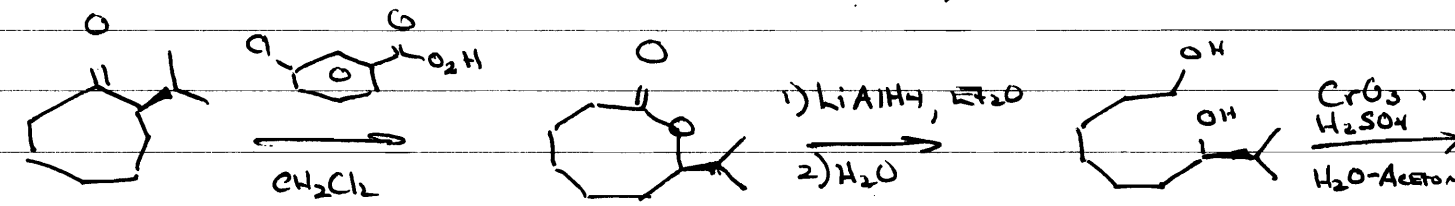
g)


PhH, Δ
H+ (cat)
1) LDA, THF
-78°
2)
H2C=PPh3
THF, Δ
H3O+ (cat)
H2O

h)

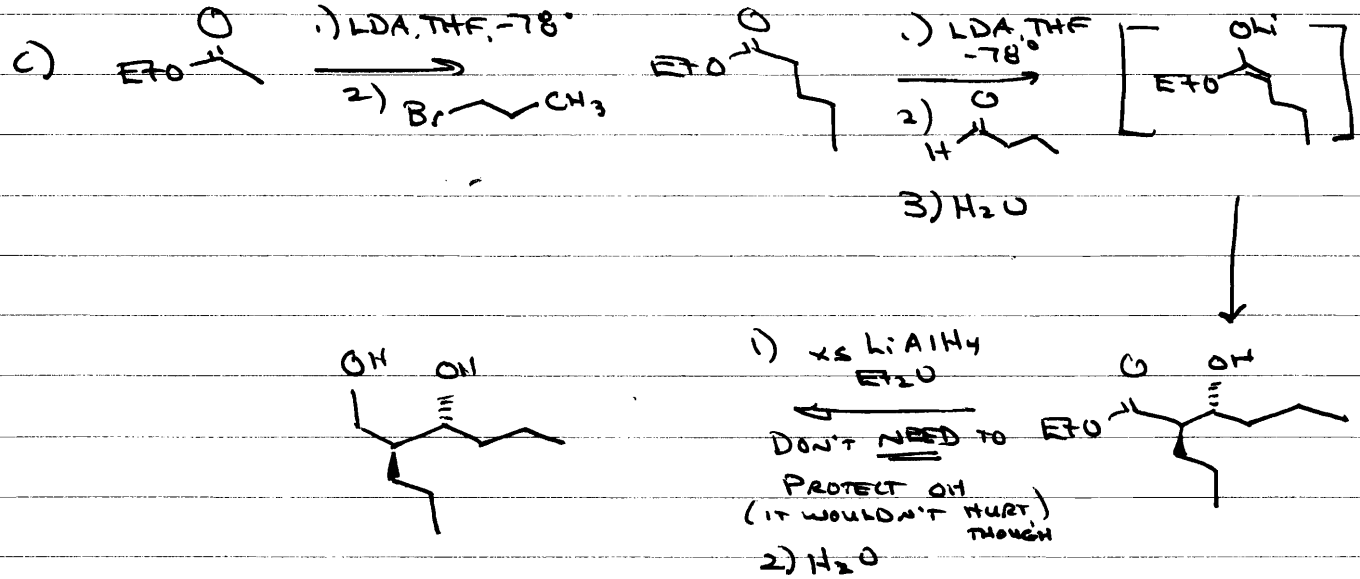

1) BH3·THF, THF
2) H2O2, HO-
CrO3, H2SO4
H2O-ACETONE
1)
(EtO)2P
EtO
+NaH, THF
2) ADD *
1) 2equiv MeLi, Et2O
2) H2O

i)

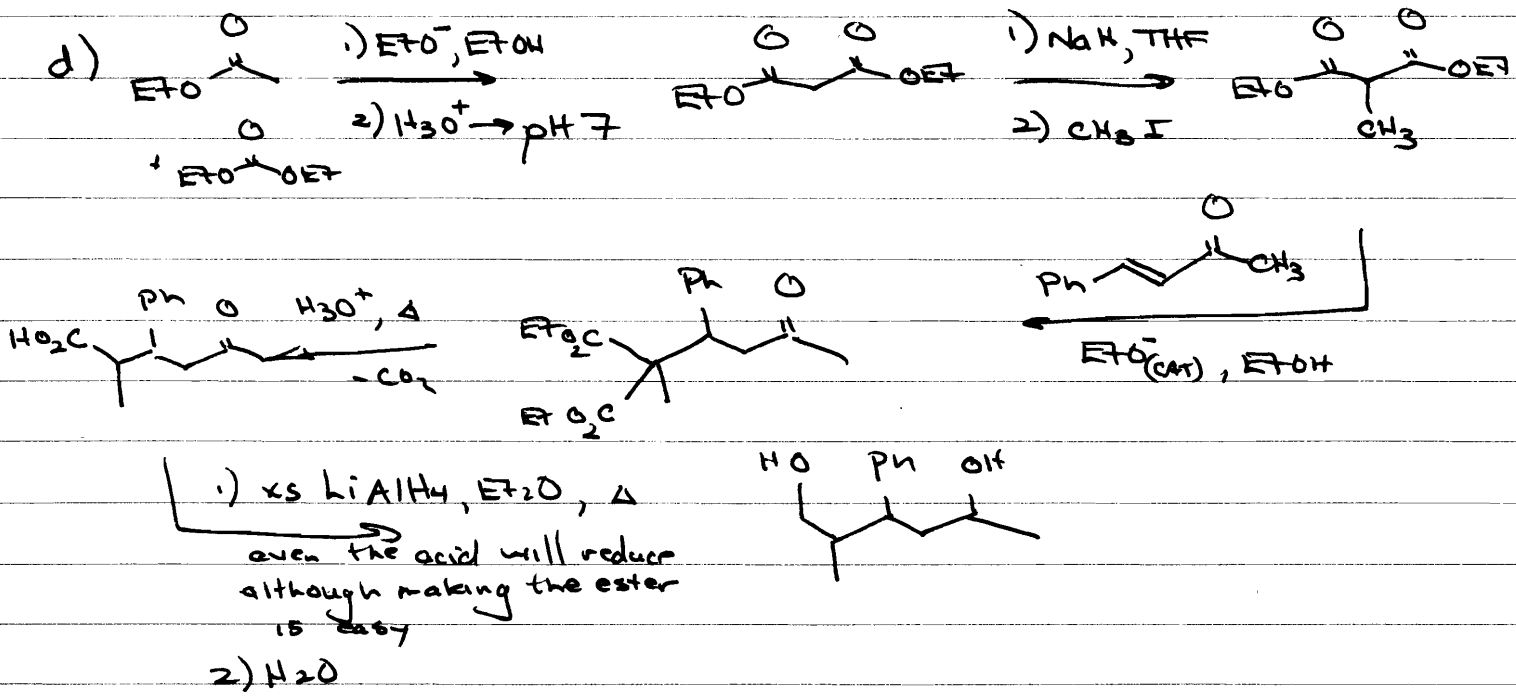

CH2Cl2
1) LiAlH4, Et2O
2) H2O
CrO3, H2SO4
H2O-ACETONE

CONT'D.

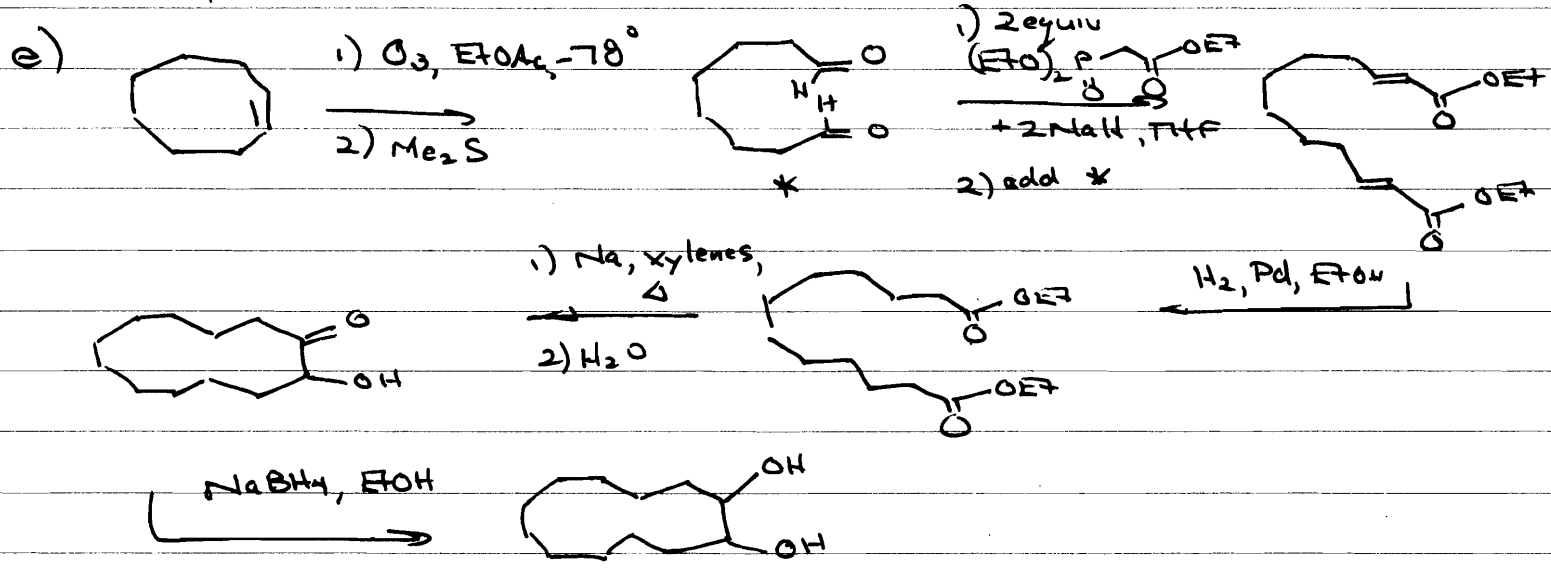
c)

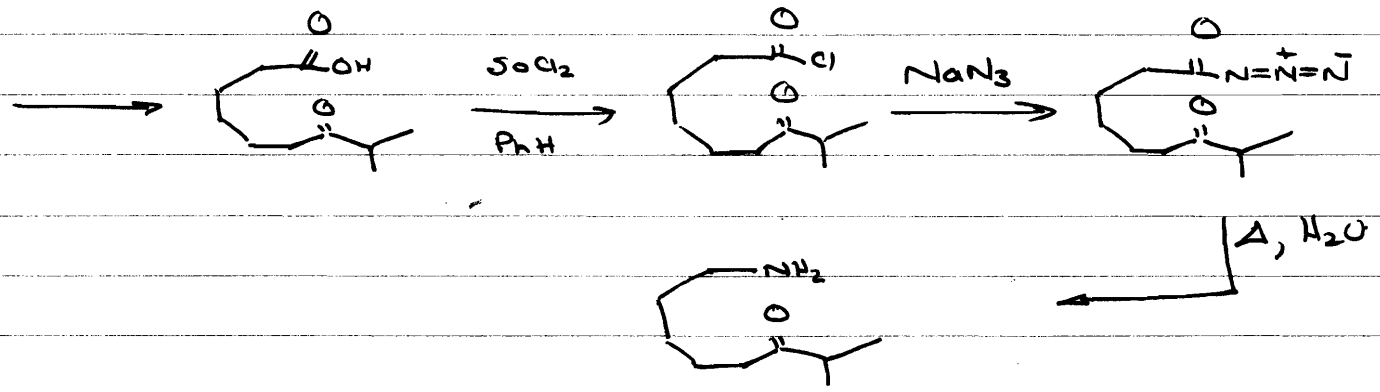

1) LDA, THF, -78°
2) Br CH3
1) LDA, THF -78°
2) H
3) H2O
1) xs LiAlH4 Et2O
DON'T NEED TO PROTECT OH (IT WOULDN'T HURT THOUGH)
2) H2O

d)

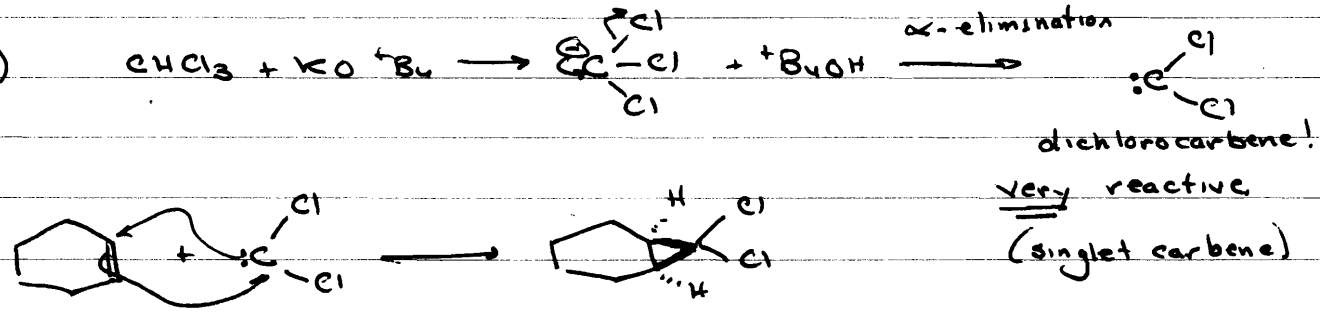
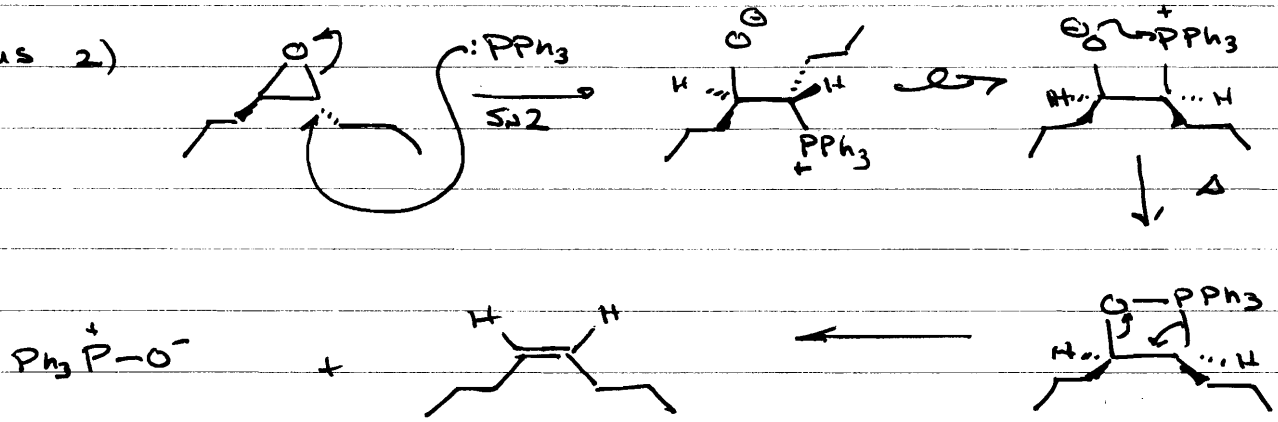

1) EtO⁻, EtOH
2) H3O⁺ → pH 7
1) NaH, THF
2) CH3I
H3O⁺, Δ
-CO2
EtO⁻(CAT), EtOH
1) xs LiAlH4, Et2O, Δ
even the acid will reduce although making the ester is easy
2) H2O

e)


1) O3, EtOAc, -78°
2) Me2S
1) 2 equiv
+ 2 NaH, THF
2) add *
1) Na, xylenes, Δ
2) H2O
H2, Pd, EtOH
NaBH4, EtOH



Bonus 1)



Bonus 2)