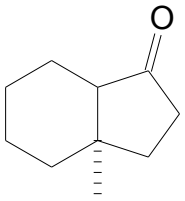
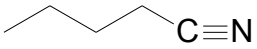
1. (40 pts) Draw the structure(s) of the major organic product(s) formed ***after each step*** in the following reaction sequences.

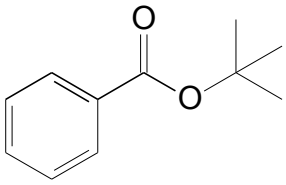
A) 

1) LDA, THF -78 ^{o}C
2) PhSeCl or PhSeSePh
3) H_2O_2

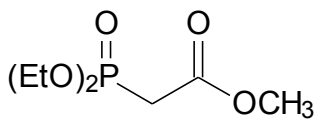
B) 

1) $LiAlH_4$, then aq. workup
2) $PhCH_2CO_2H$, DCC, Et_3N

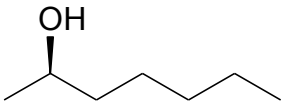
DCC = Cy—N=C=N—Cy
Cy = cyclohexyl

C) 

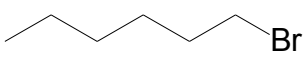
1) CF_3CO_2H
2) BH_3
3) H_2O
4) $CH_3C(O)Cl$, Et_3N

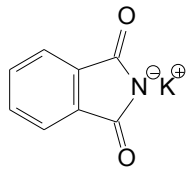
D) 

1) PCl_5
2) CF_3CH_2OH (2 eq), pyridine
3) $[(CH_3)_3Si]_2NK$, 18-crown-6
4) PhCHO

E) 

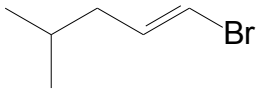
1) DMSO, $(COCl)_2$, Et_3N
2) $LiCH_2SiMe_3$
3) H_3O^+
4) KH

F) 

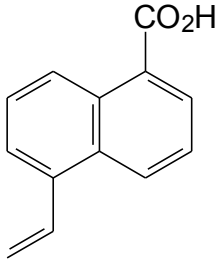


1)

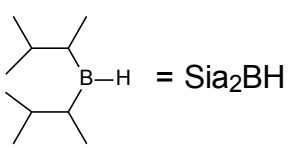
2) H_2NNH_2, EtOH, heat

G) 

1) *n*-BuLi, THF, -78 °C
2) $CH_3CO_2^{\ominus}\ Li^{\oplus}$
3) H_3O^+ (dilute)

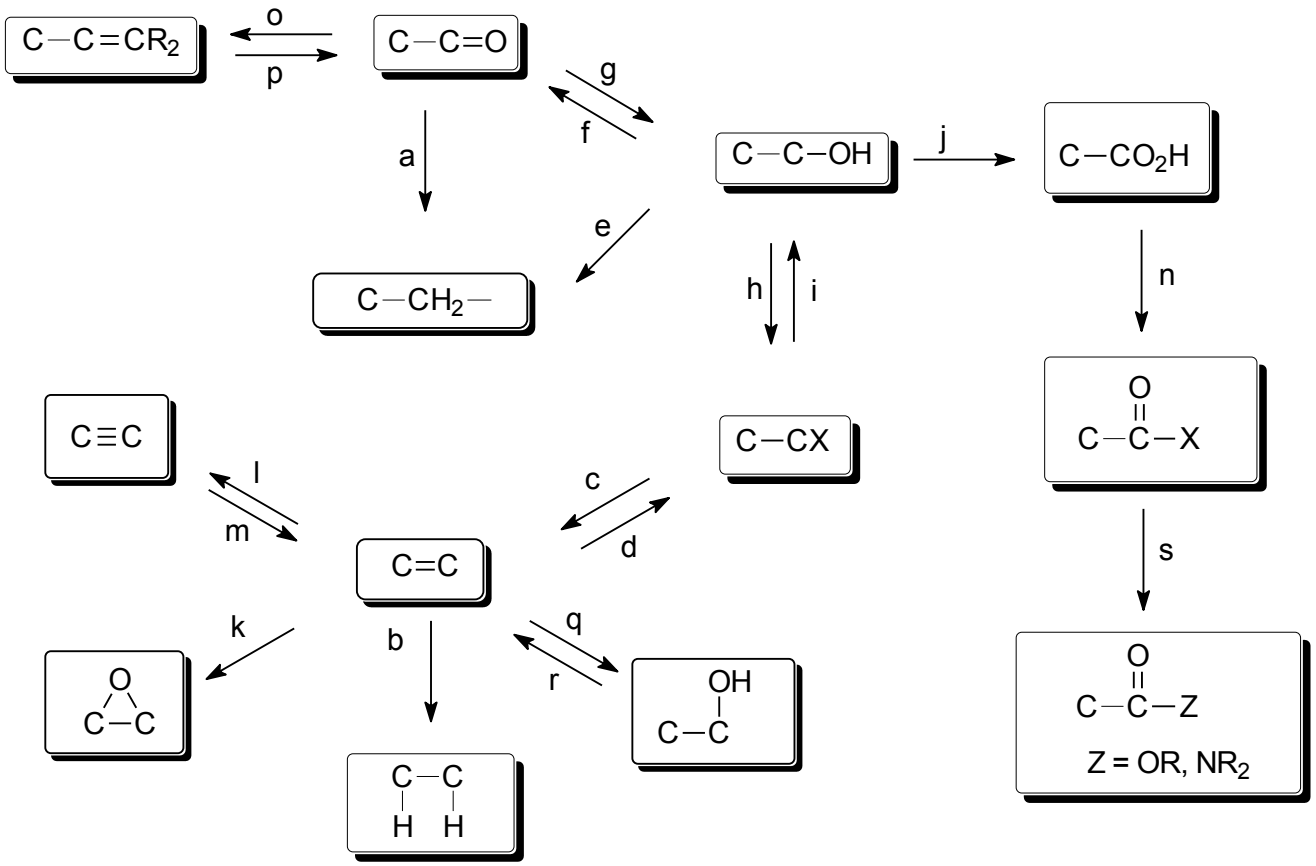
H) 

1) $SOCl_2$
2) $Me_3SiCH_2CH_2OH$, Et_3N
3) Sia_2BH, THF
4) H_2O_2, NaOH



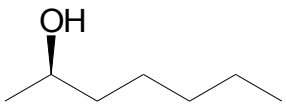
2. (20 pts) Suggest a reagent, or sequence of reagents, which will accomplish the following common functional group transformations. Note: only step o) involves a C-C bond forming reaction, not all of the C valences are filled in the generic substrates below.

Common Functional Group Transformations

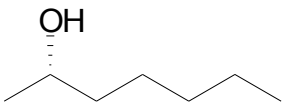


a)	f)	k)	p)
b)	g)	l)	q)
c)	h)	m)	r)
d)	i)	n)	s)
e)	j)	o)	

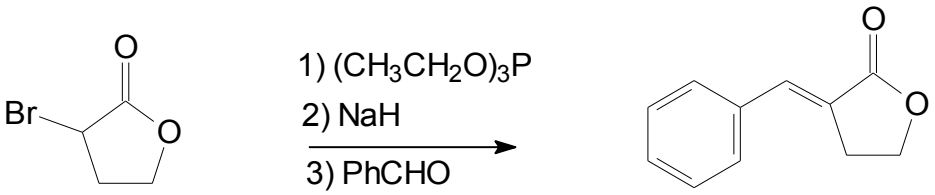
3. (15 pts) Propose a reasonable stepwise mechanism for the following reaction. Draw the structures of all of the intermediates formed (including resonance structures, if applicable) in your proposed pathway. Use curved arrow notation to indicate the movement of electrons.



1) $EtO_2CN{=}NCO_2Et$, PPh_3
$PhCO_2H$, Et_2O
2) 1N NaOH, H_2O



4. (15 pts) Propose a reasonable stepwise mechanism for the following reaction. Draw the structures of all of the intermediates formed (including resonance structures, if applicable) in your proposed pathway. Use curved arrow notation to indicate the movement of electrons.



5. (10 pts). Propose a reasonable stepwise mechanism for the following reaction. Draw the structures of all of the intermediates formed (including resonance structures, if applicable) in your proposed pathway. Use curved arrow notation to indicate the movement of electrons.