NAME (Print): _____

SIGNATURE: _____

Chemistry 320N
Dr. Brent Iverson
8th Homework
March 26, 2024

Please print the first three letters of your last name in the three boxes

Fill in the missing arrows and reagents to complete this roadmap using all the reactions you have learned this semester that interconvert these types of molecules.

Substituted aldehyde

Substituted ketone

β-Diester

β-Ketoaldehyde

β-Diketone

Carboxylic acids

Aldehydes

Ketones

Carboxylic esters

β-Hydroxy aldehydes

Acid Chlorides

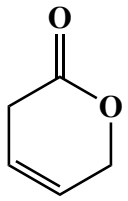
α,β-Unsaturated aldehydes

β-Substituted aldehydes, nitriles, ketones, or esters

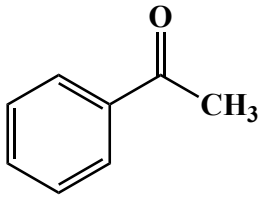
α,β-Unsaturated, nitriles, ketones, or esters

β-Keto esters

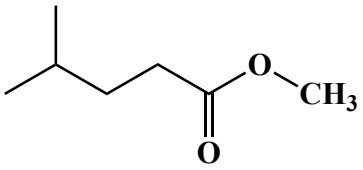
Write the predominant product that will occur for each transformation. If a new chiral center is created and a racemic mixture is formed, you must draw both enantiomers and write "racemic" under the structure. Use wedges (◄) and dashes (····ıı) to indicate stereochemistry. For these, you do not have to worry about metal salts in the products.



1) HO⊖ (1.0 equivalent)
2) HCl / H_2O (mild)

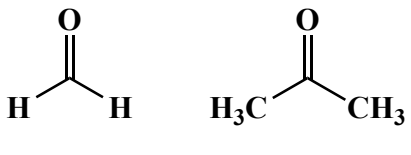


1) Br_2 / HO⊖ Excess and heat
2) HCl / H_2O (mild)



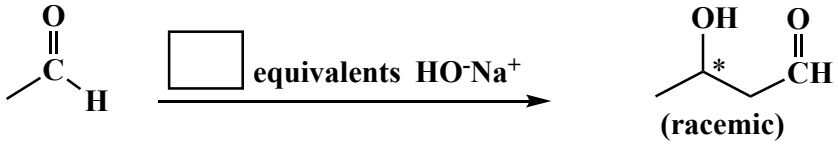
1) CH_3O⊖ 0.5 equivalents
2) HCl / H_2O mild

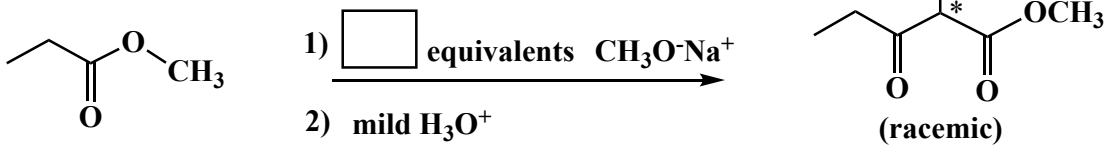
There is a lot to think about here. Please take your time. ASSUME THIS DEHYDRATES.

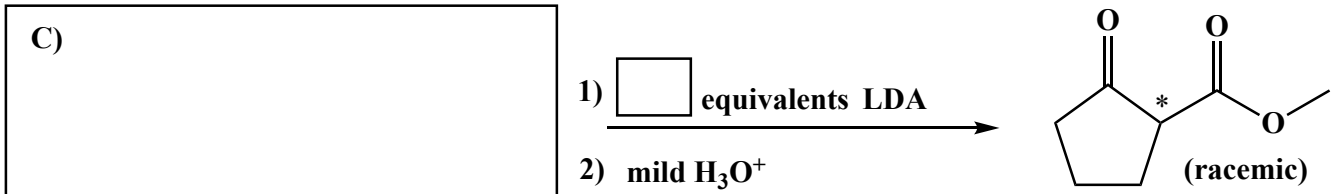


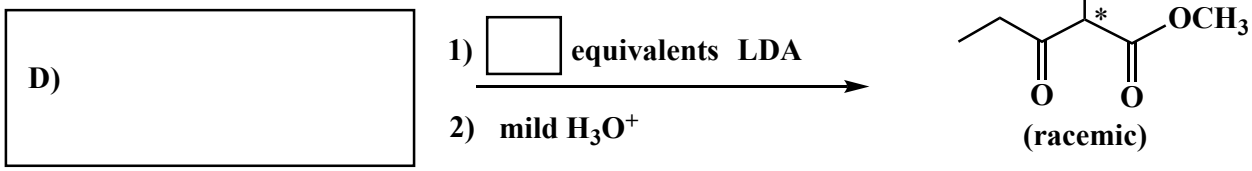
1) HO⊖ (catalytic)
2) H⊕ heat

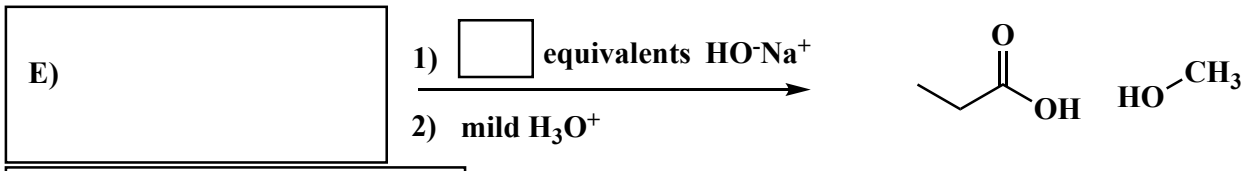
In each of the boxes over an arrow, **write the minimum number of equivalents** of the specified reagent required to carry out the reaction shown **to completion**. If only a catalytic amount is needed, write **"CAT"**. Note: **You must assume the carbonyl compound starting material is initially present in an amount of 1.0 equivalent. In the problems with an empty reagent box, C) - F), fill in the missing starting material.**

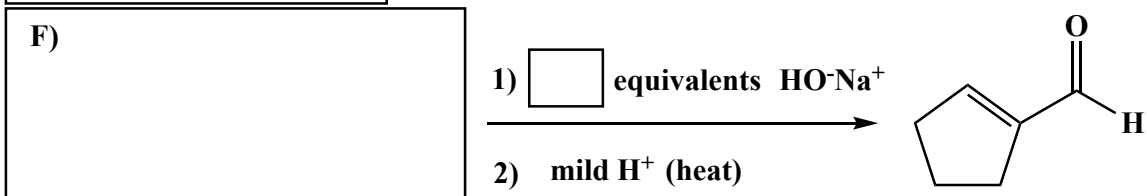
A) 

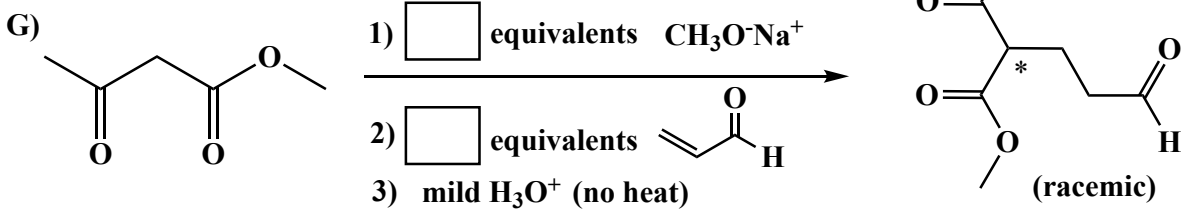
B) 

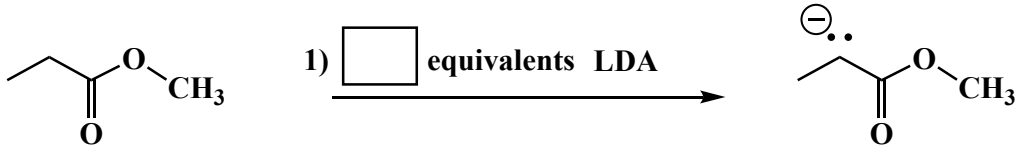
C) 

D) 

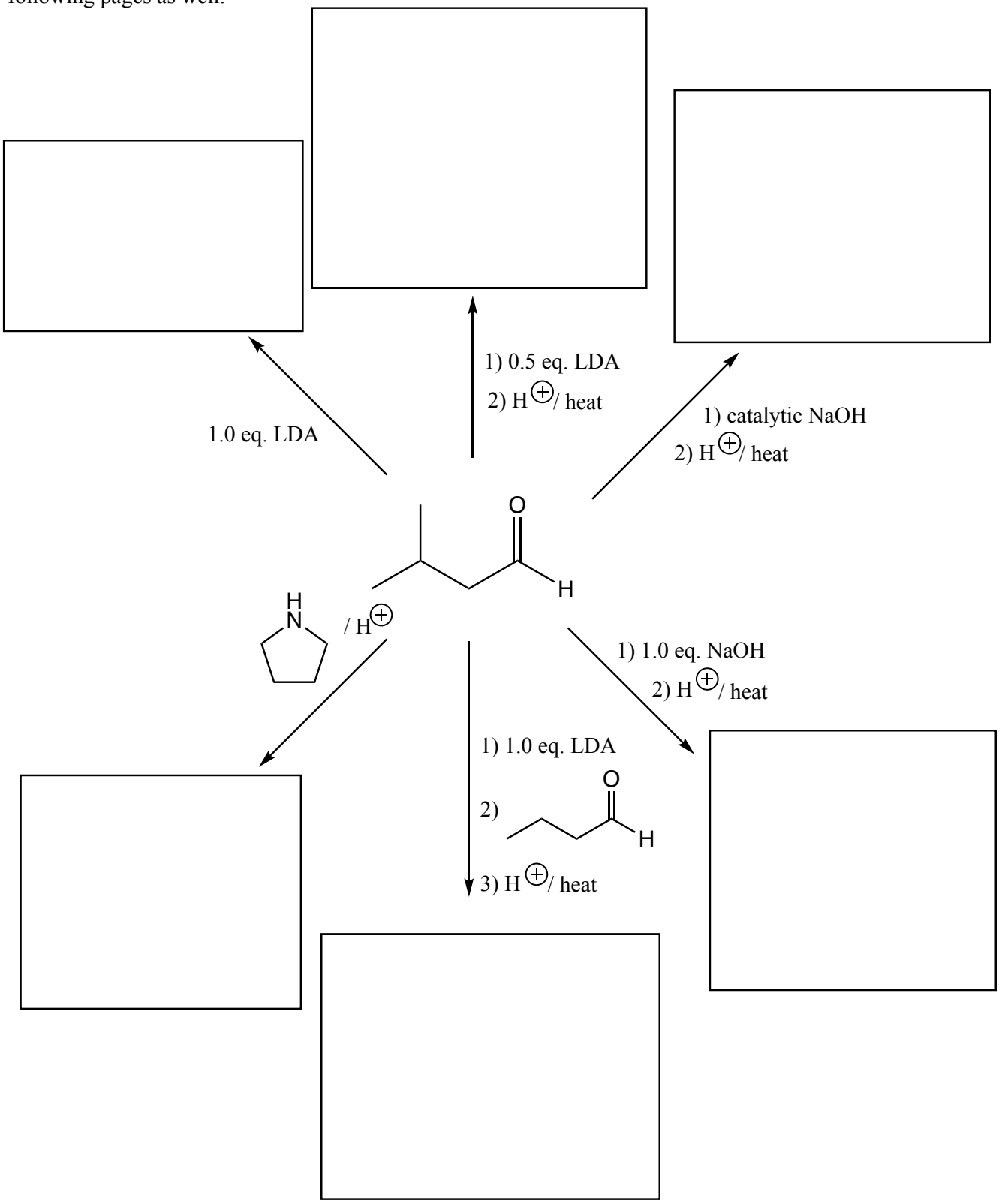
E) 

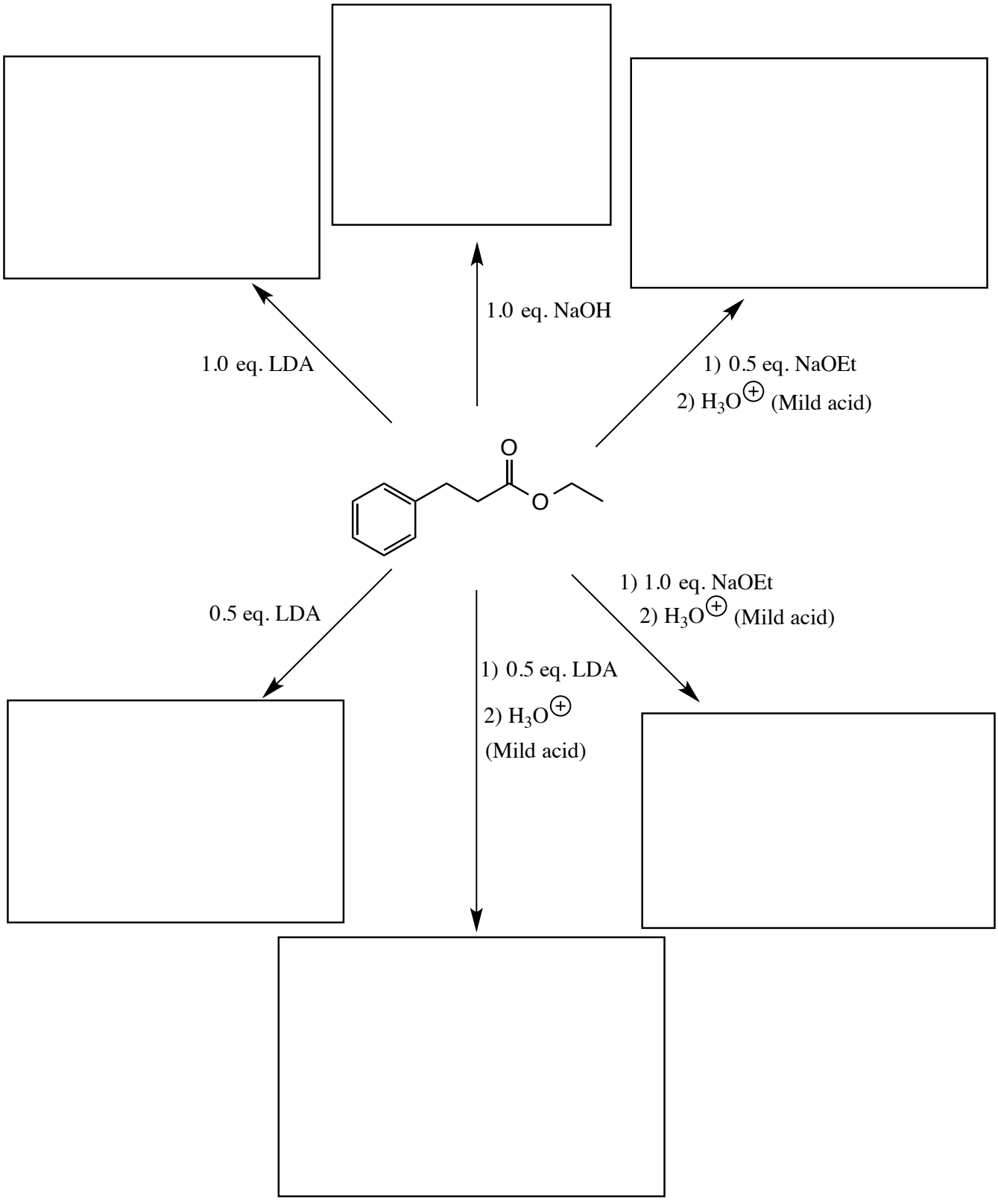
F) 

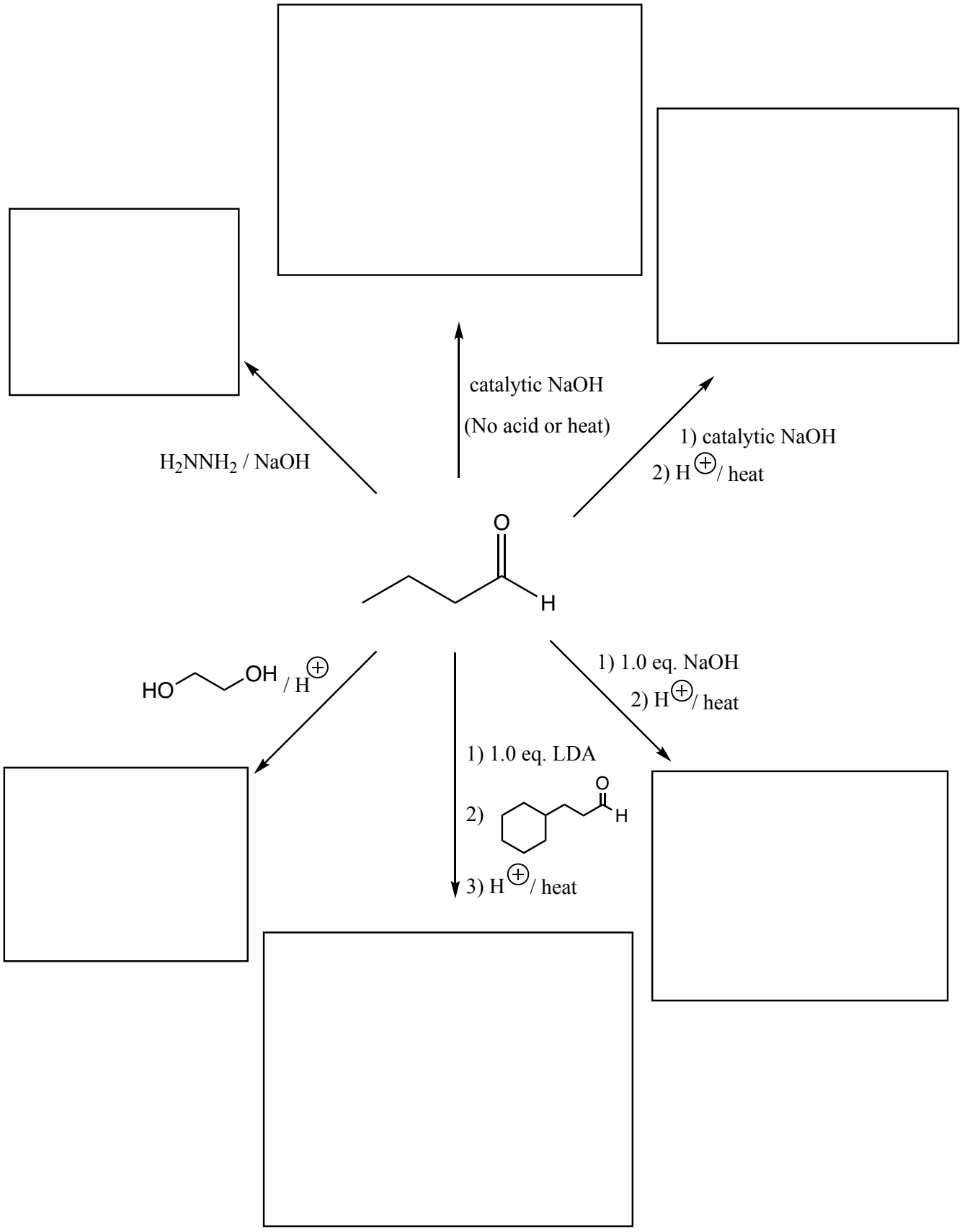
G) 

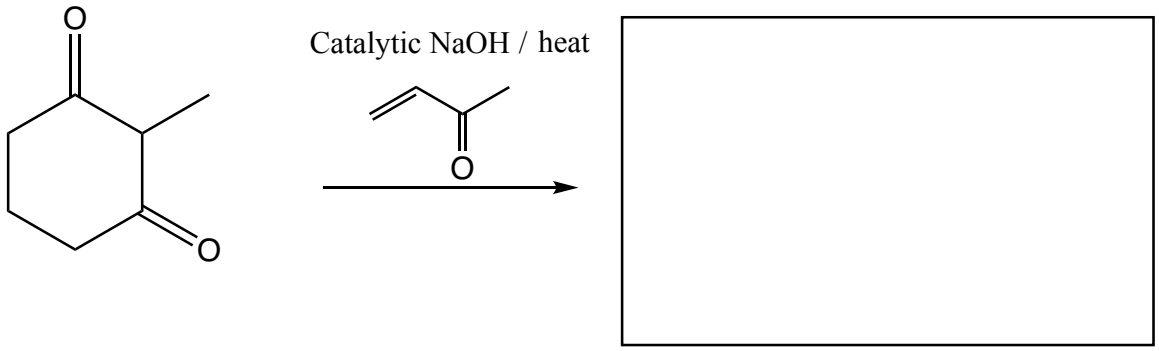
H) 

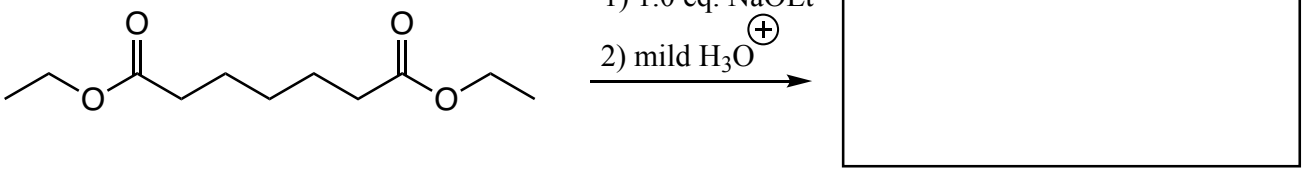
Fill in the boxes with the appropriate structure or structures. Because these structures are getting complex, you **do not need to draw both enantiomers. Instead, when a new chiral center is created, just mark it with an asterisk (*) and label the product as "racemic". No need to use wedges and dashes.** Also, when an E,Z mixture is formed, only draw one and label it as "E,Z mixture". These directions apply to all of the following pages as well.

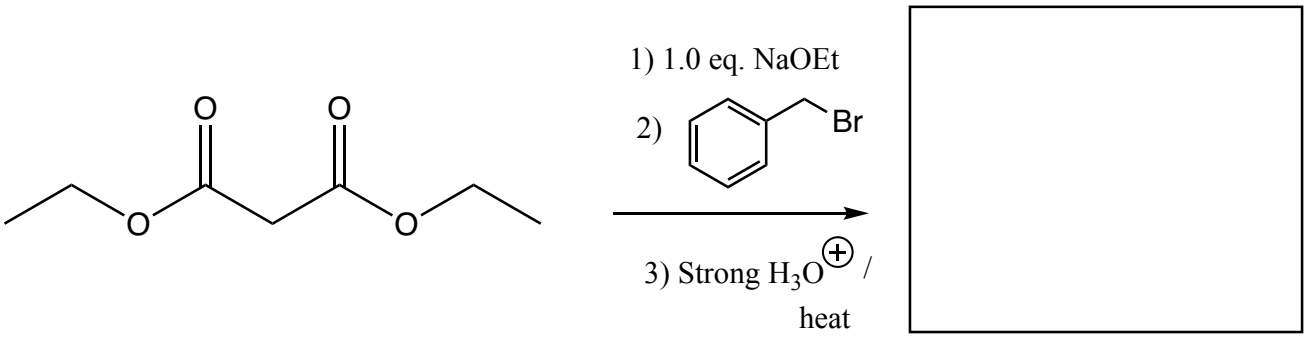



1.0 eq. LDA
1.0 eq. NaOH
1) 0.5 eq. NaOEt
2) $H_3O^{\oplus}$ (Mild acid)
O
O
0.5 eq. LDA
1) 1.0 eq. NaOEt
2) $H_3O^{\oplus}$ (Mild acid)
1) 0.5 eq. LDA
2) $H_3O^{\oplus}$
(Mild acid)

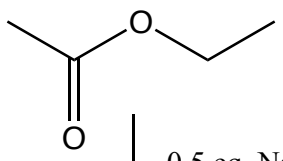

catalytic NaOH
(No acid or heat)
H_2NNH_2 / NaOH
1) catalytic NaOH
2) H⊕/ heat
O
H
HO
OH / H⊕
1) 1.0 eq. NaOH
2) H⊕/ heat
1) 1.0 eq. LDA
2)
O
H
3) H⊕/ heat


Catalytic NaOH / heat


1) 1.0 eq. NaOEt
2) mild H3O⊕


1) 1.0 eq. NaOEt
2)
Br
3) Strong H3O⊕ / heat


1) O3
2) (CH3)2S
1) catalytic NaOH
2) H⊕ / heat



0.5 eq. NaOEt

Mild $H_3O^{\oplus}$

No heat

1) 1.0 eq. of NaOEt

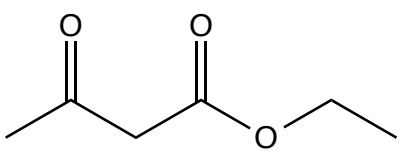
2) 

1) Strong $H_3O^{\oplus}$

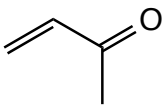
2) Heat

1) $H_3C—MgBr$

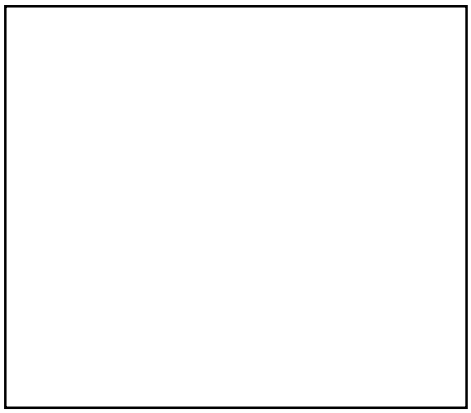
2) $H_3O^{\oplus}$

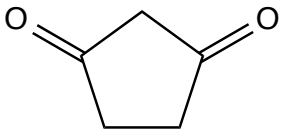


1) 1 Eq. NaOEt

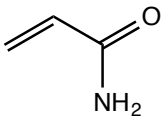
2) 

3) Mild $H_3O^{\oplus}$

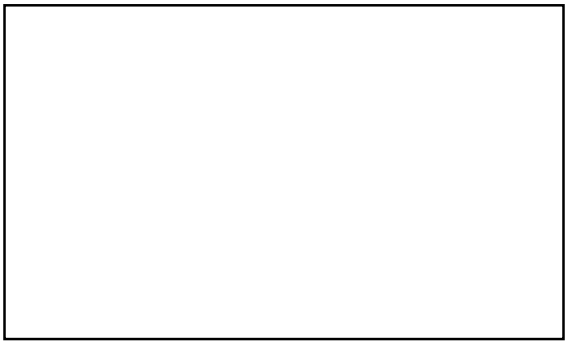




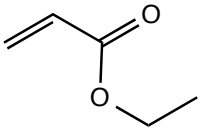
1) 1 Eq. NaOEt

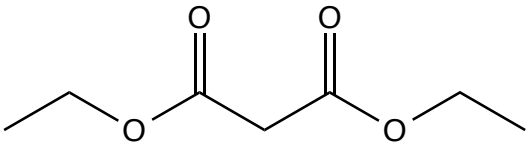
2) 

3) Mild $H_3O^{\oplus}$

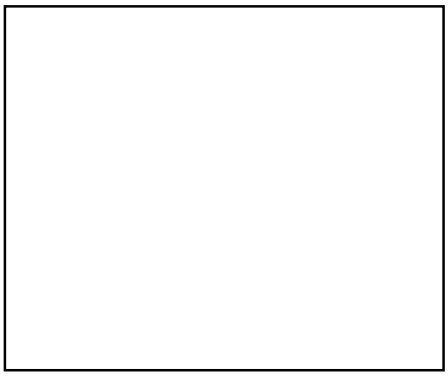


1) 1 Eq. NaOEt

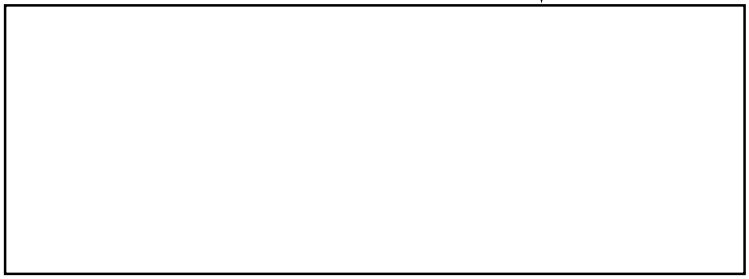
2) 

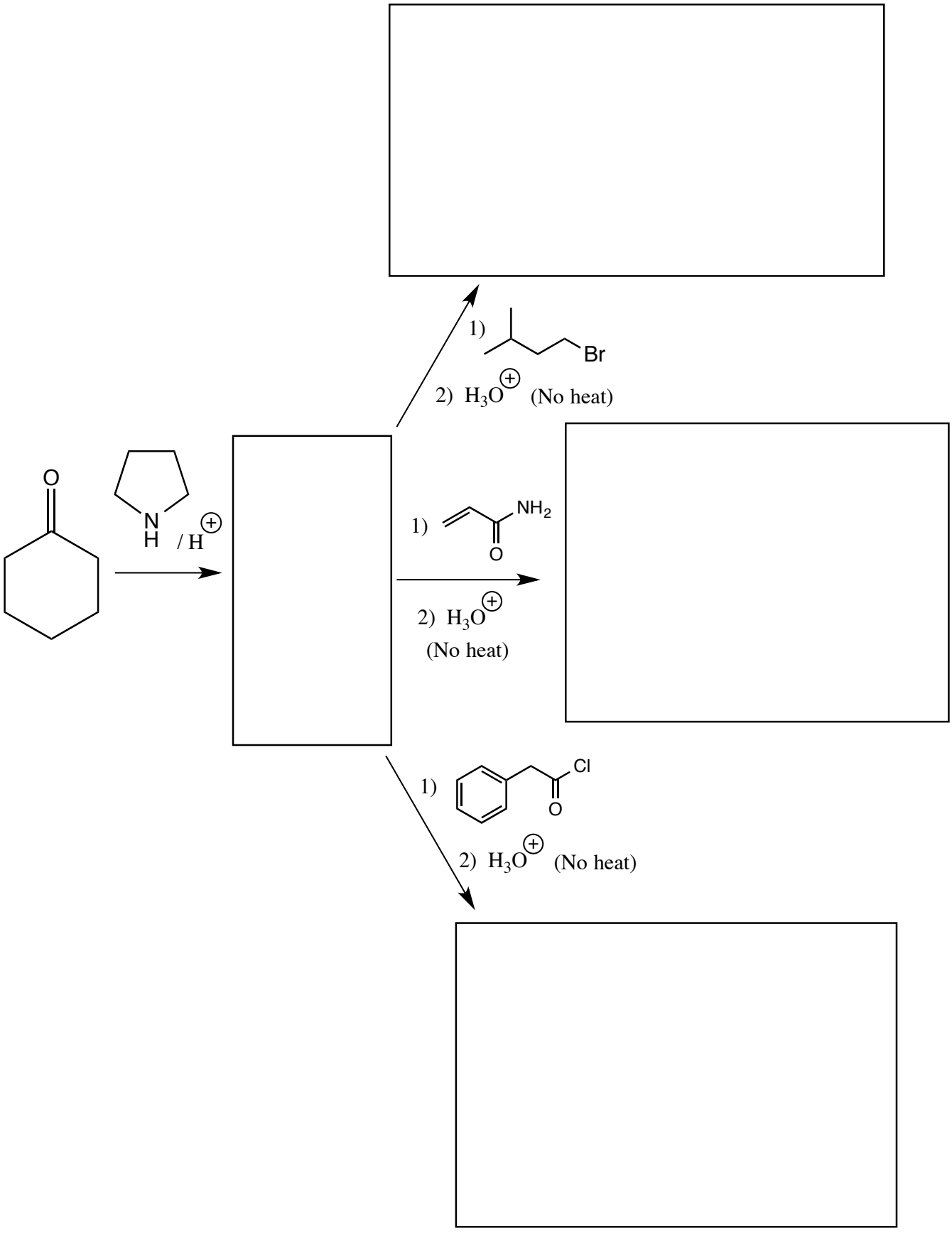


3) Mild $H_3O^{\oplus}$



3) Strong $H_3O^{\oplus}$/heat




1)
Br
2) $H_3O^{\oplus}$ (No heat)
O
N
H
/ $H^{\oplus}$
1)
NH_2
O
2) $H_3O^{\oplus}$
(No heat)
1)
Cl
O
2) $H_3O^{\oplus}$ (No heat)