Student ID _____ Name_____

page	points:
2	(15)
3	(21)
4	(30)
5	(24)
6	(10)
Total	(100)

Periodic Table

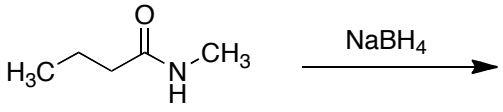
H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La	Ha	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac															

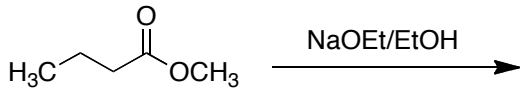
Please sit with an empty seat between you and your neighbors.

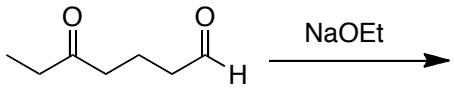
Unless specifically asked, you do not have to draw mechanisms for reactions.

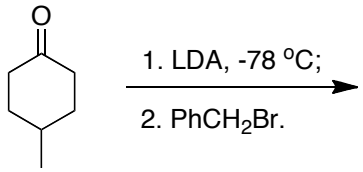
Feel free to ask questions about the questions, but please don't ask questions about your answers, it distracts your neighbors.

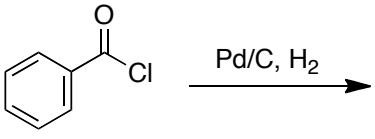
1 Provide the products of the following reactions (all reactions have an appropriate aqueous work up). If no reaction would occur, write NR. (3 pts each).

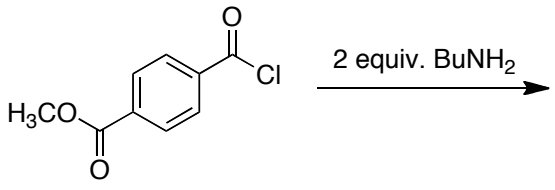
a) 

b) 

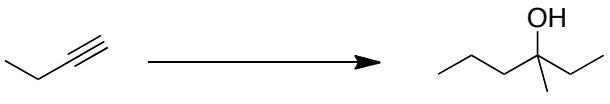
c) 

d) 

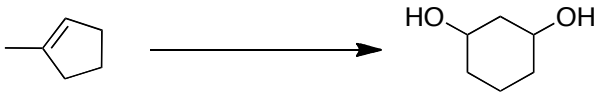
e) 

f) 

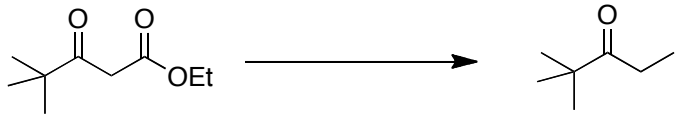
2) Complete the following syntheses using any reagents you need. You do not have to show the synthesis of the reagents you use, but **you must use the starting material indicated**. If your synthesis requires more than one step, **provide the product after each step**. All chiral products are racemic mixtures.

a) 

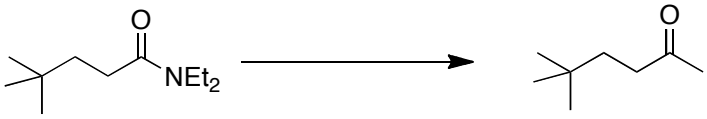
(9 pts)

b) 

(9 pts)

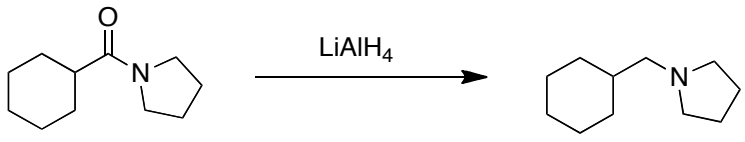
c) 

(9 pts)

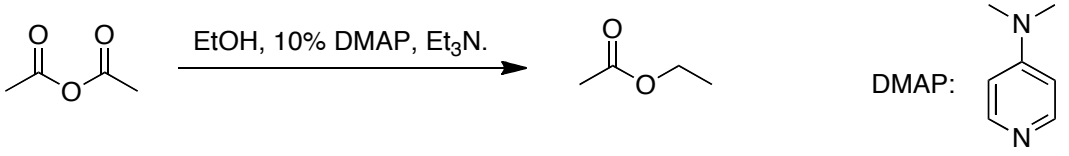
d) 

(9 pts)

3) Provide the mechanism for the following reaction. Show every intermediate with the proper charges and all the arrows required for each step of the reaction (12 pts each).

a) 

b)



4) Draw the structure and rank the relative reactivity of the following carbonyl-containing functional groups in term of nucleophilic addition: aldehyde, ketone, ester, amide, and acid chloride (8 pts), and explain why (4 pts).

5) What is the approximate pKa value of the following acid (2 pts each).