

CHEM 302 Exam 3

Dr. Hanna

July 28, 2008

Honor Pledge:

In Part V of the Winthrop University Student Conduct Code, it is stated that "A fundamental tenet of all institutions of higher learning is academic honesty. ... Misrepresentation of someone else's work as one's own is a most serious offense in any academic setting. ... Academic misconduct includes but is not limited to providing or receiving assistance in a manner not authorized by the professor in the creation of work to be submitted for academic evaluation including papers, projects, and examinations ..."

By my signature below, I pledge that I did not commit academic misconduct (cheat) on this examination.

KEY

Printed Name

Signature

Part 1 _____/10

Part 2 _____/10

Part 3 _____/30

Part 4 _____/10

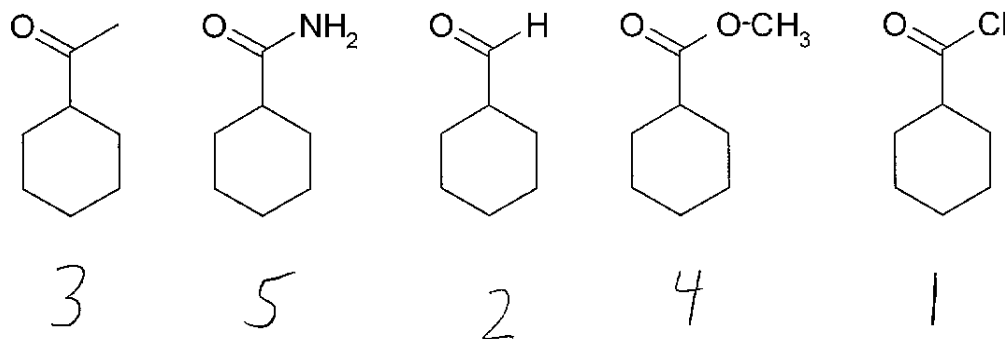
Part 5 _____/20

Part 6 _____/20

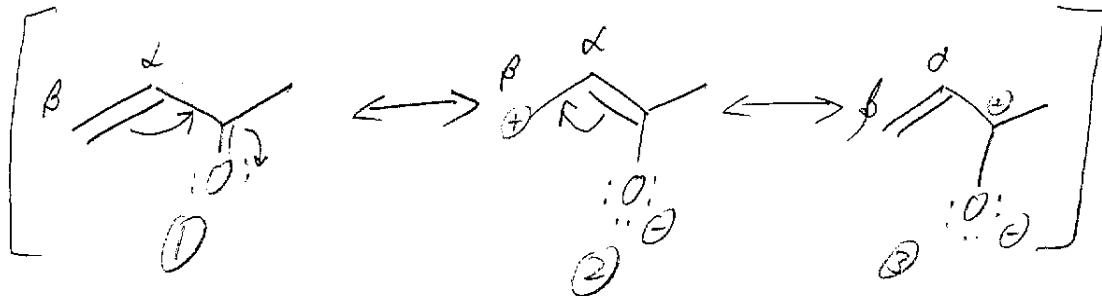
Total _____/100

1. Concepts (10 pts)

- (a) Number the following compounds in order of decreasing reaction rate toward nucleophilic addition to the carbonyl group (1 = fastest, 5 = slowest):



- (b) Explain, using resonance structures, why an α,β -unsaturated carbonyl compound can undergo nucleophilic attack at the β -carbon.

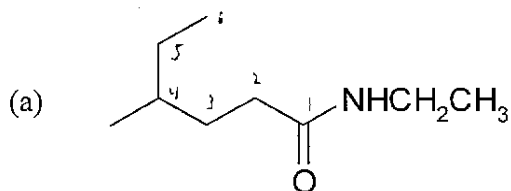


An α,β -unsaturated carbonyl compound exists as a resonance hybrid of structures 1, 2, & 3 above.

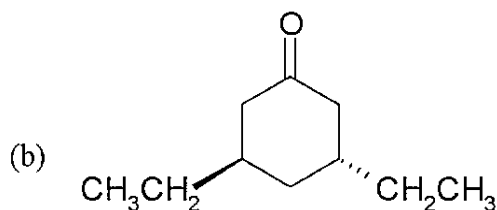
The contribution to the overall hybrid from structure (2) shows that the β -carbon is electron deficient (δ^+) & thus can undergo attack by a nucleophile.

2. Nomenclature (10 pts)

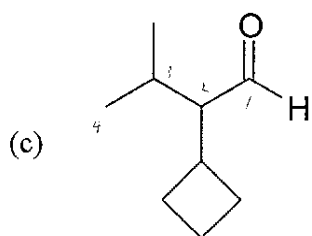
Give systematic names for the following compounds:



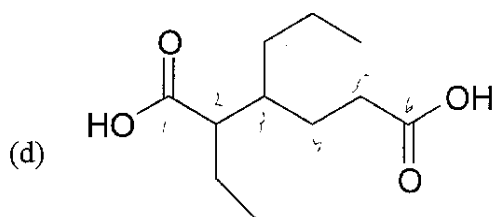
N-ETHYL-4-METHYLHEXANAMIDE



trans-3,5-DIETHYLCYCLOHEXANONE



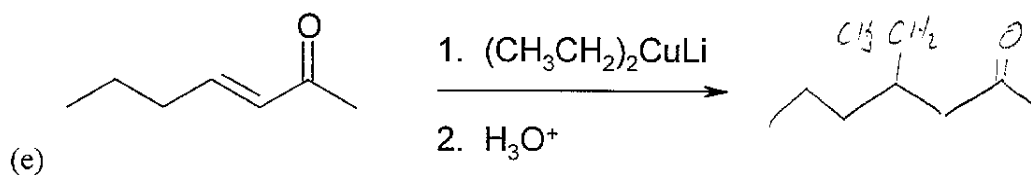
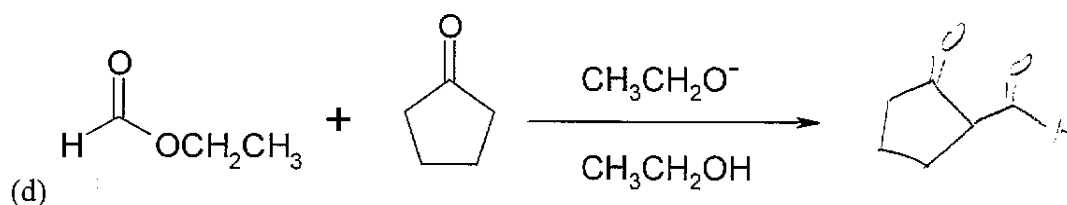
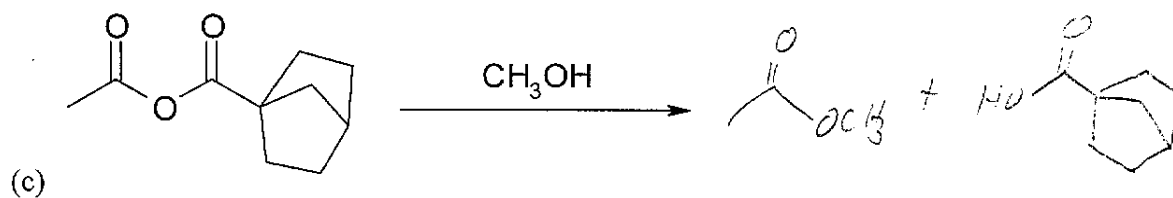
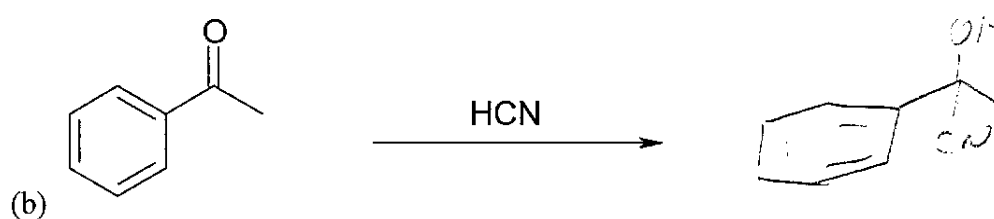
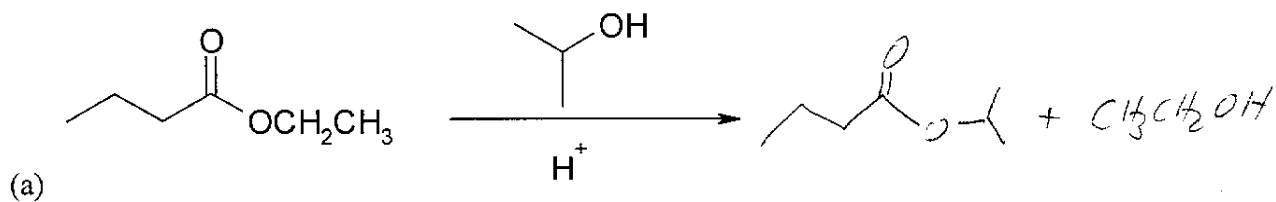
2-CYCLOBUTYL-3-METHYLBUTANAL

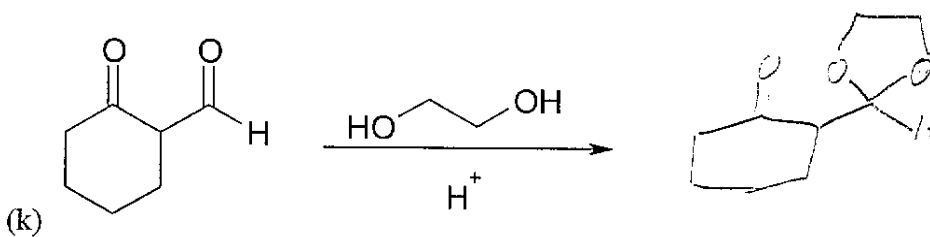
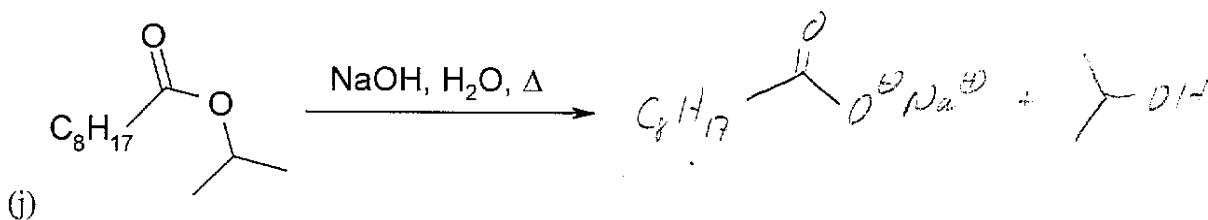
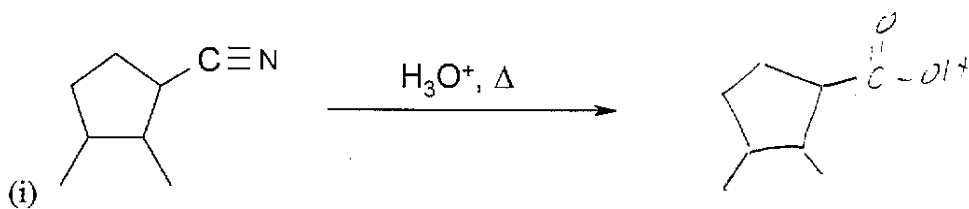
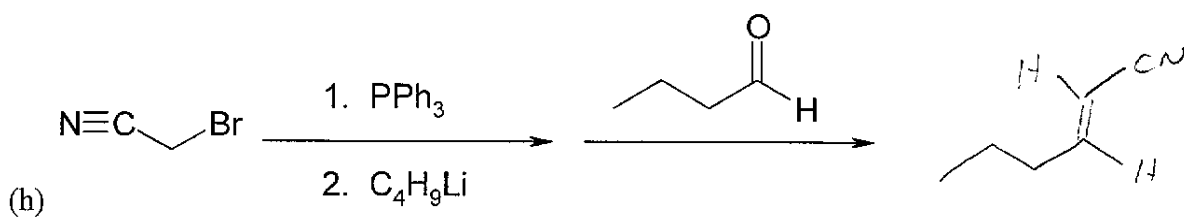
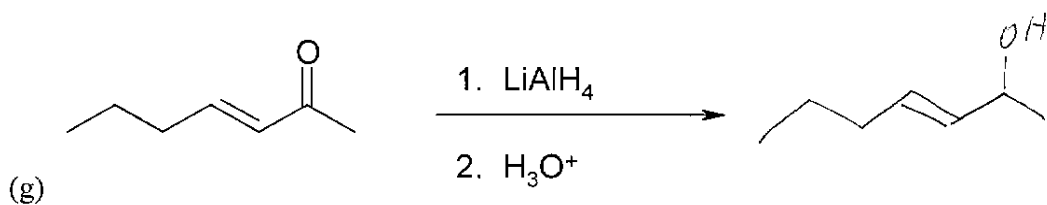
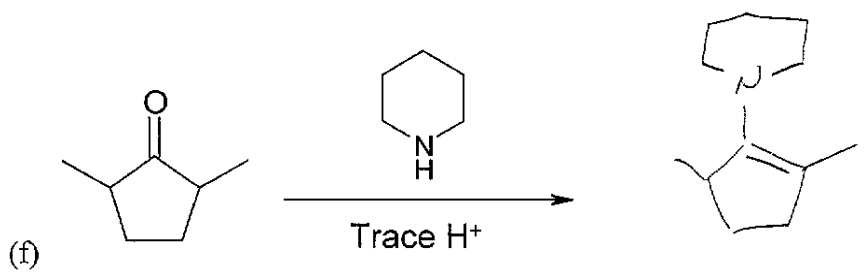


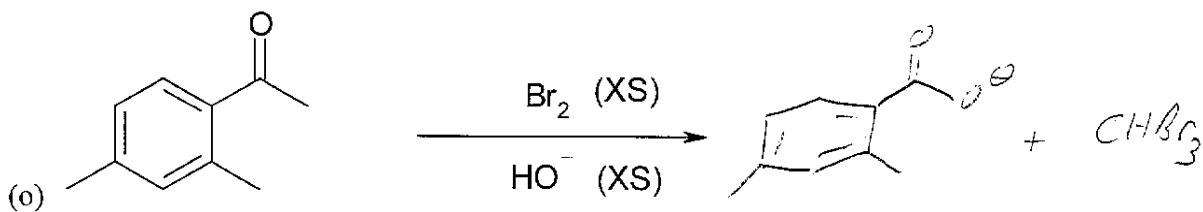
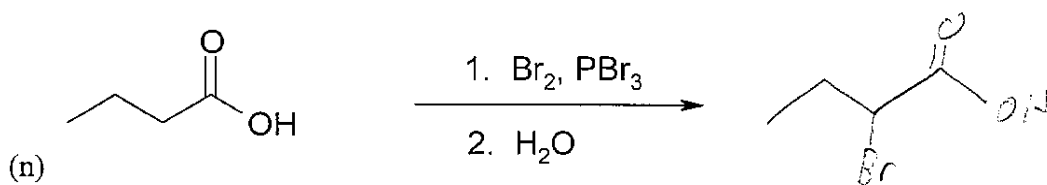
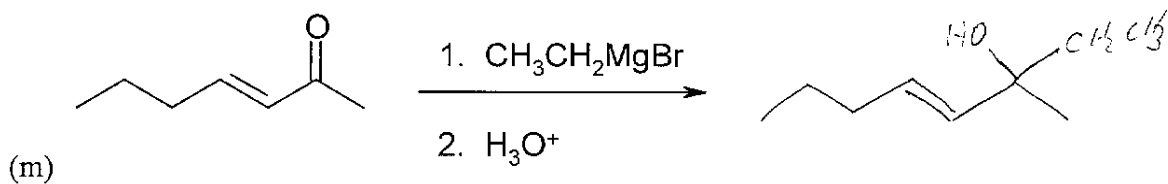
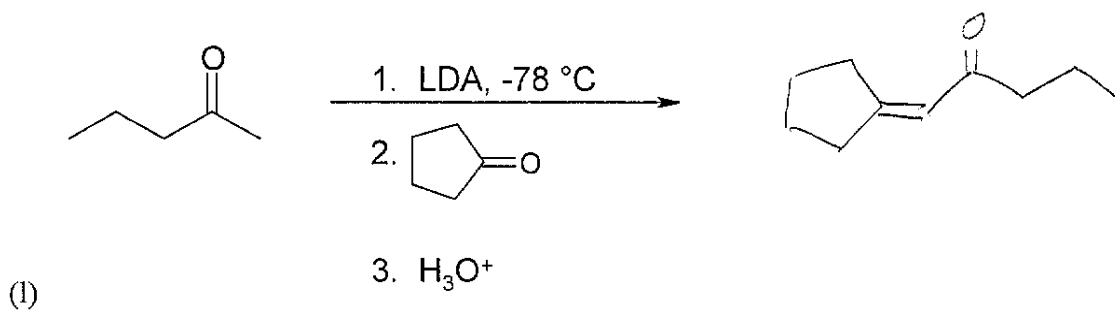
2-ETHYL-3-PROPYLHEXANEDIOIC ACID

3. Reaction Products (30 pts)

Give the major organic product(s) of the following reactions:

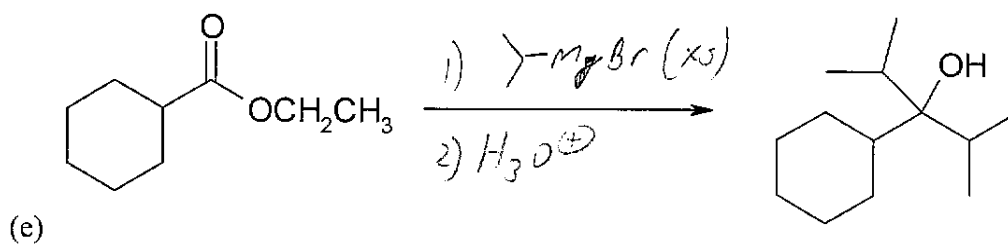
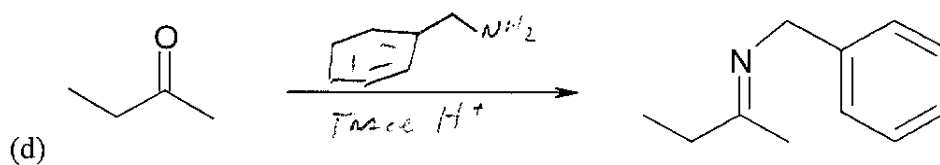
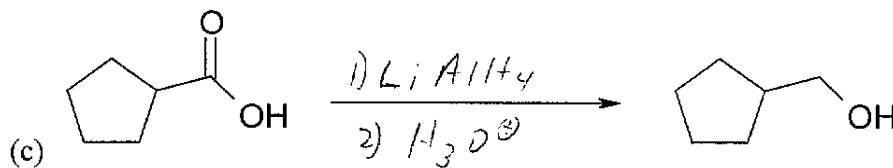
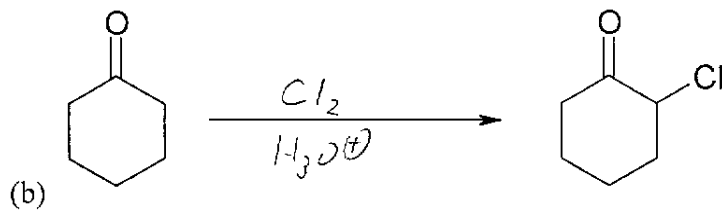
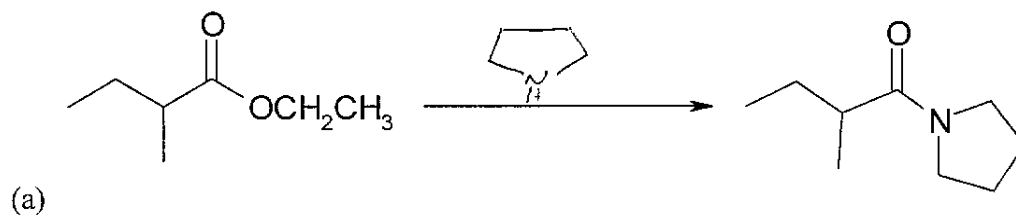






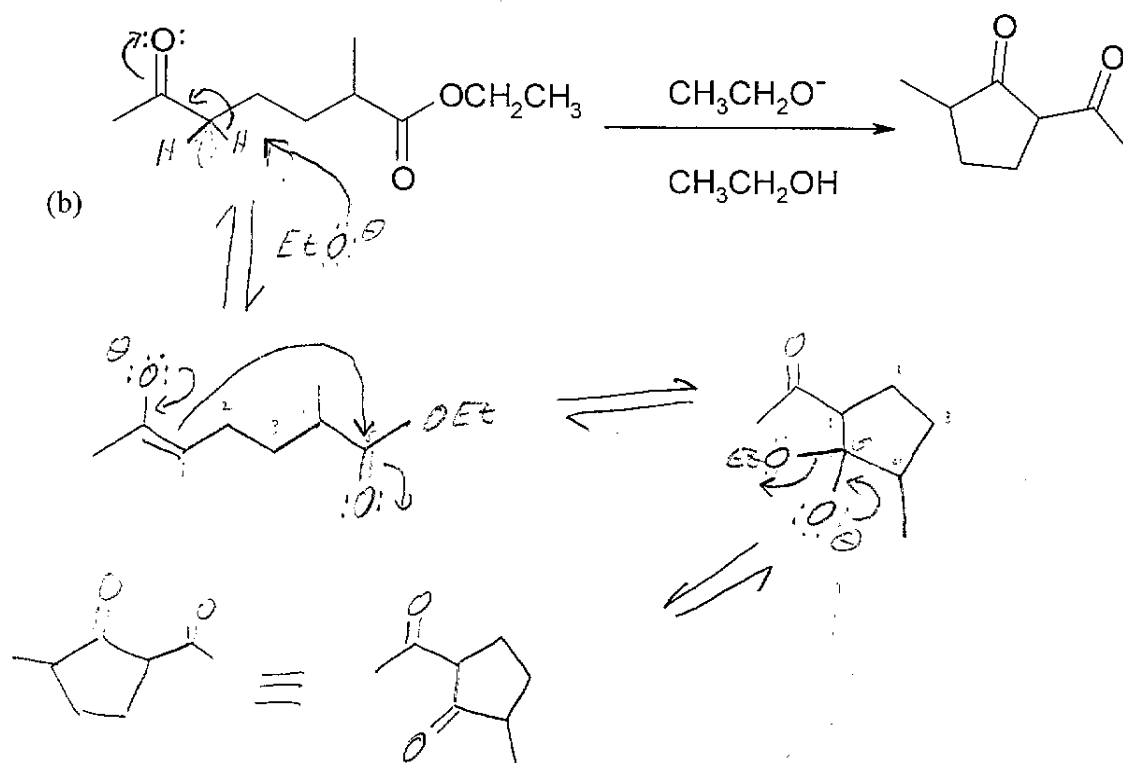
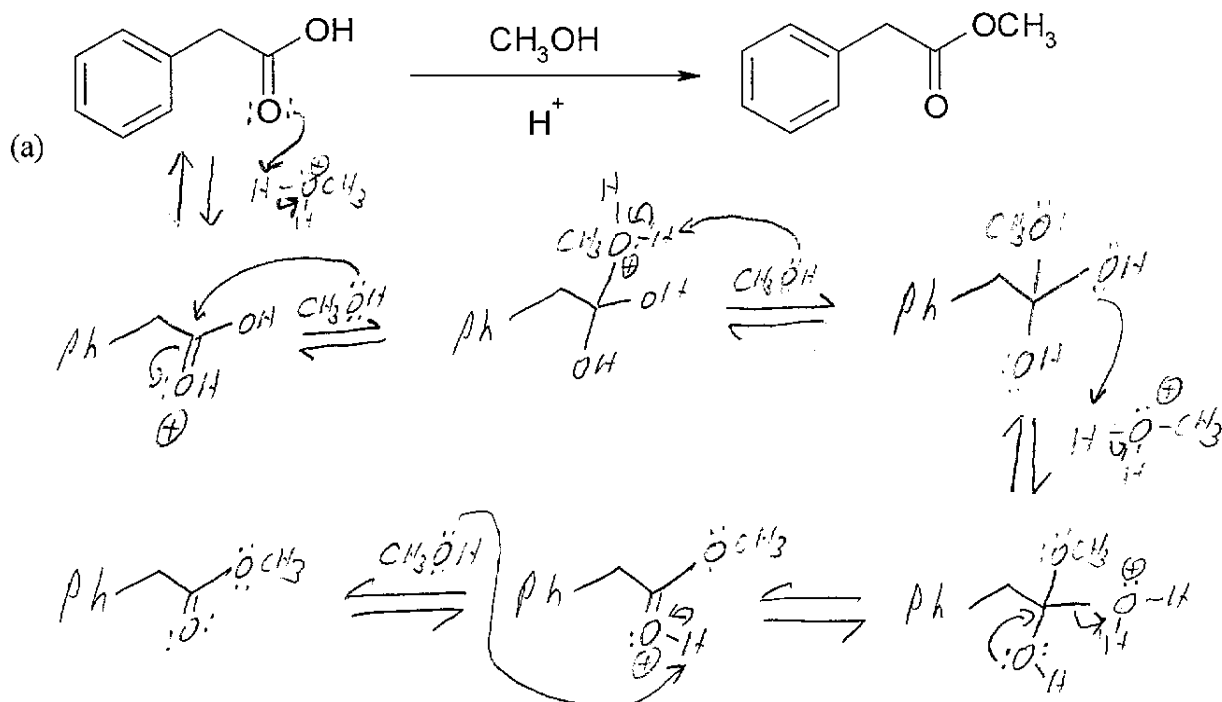
4. Reagents (10 pts)

Give the reagents needed to accomplish the following transformations:



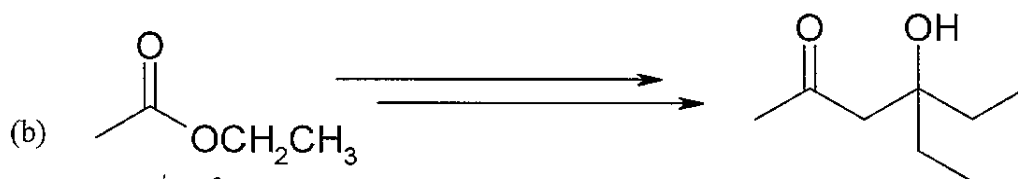
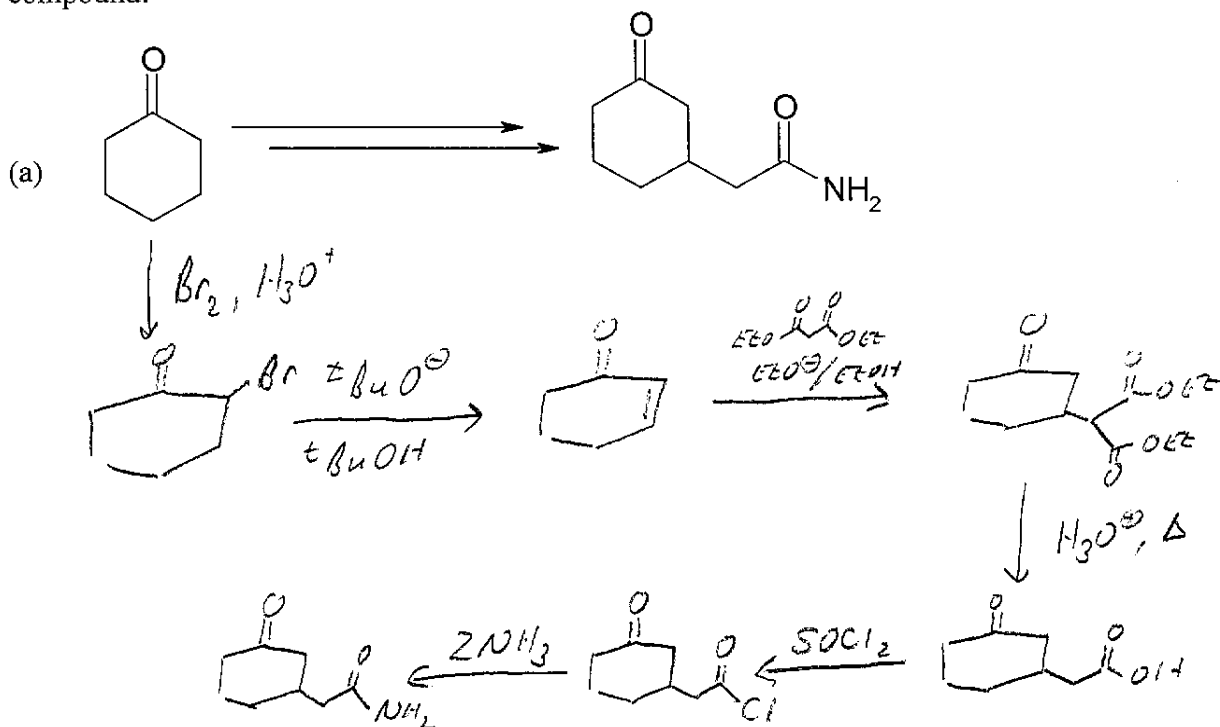
5. Mechanisms (20 pts)

Give complete arrow-pushing mechanisms for the following transformations:

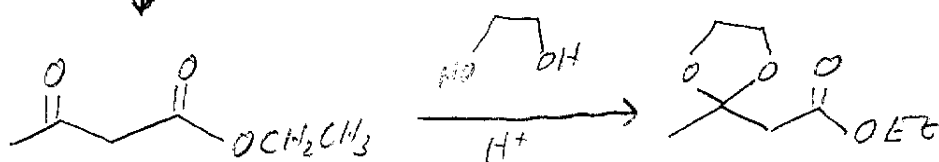


6. Synthesis (20 pts)

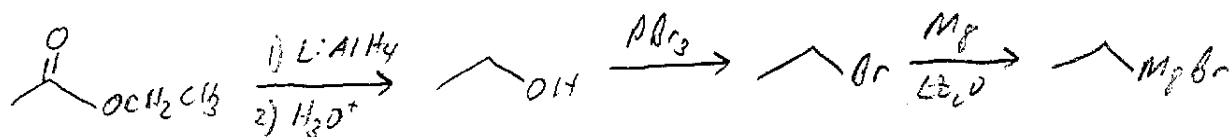
Provide reasonable syntheses of the following compounds from the indicated starting compound:



①



②



③

