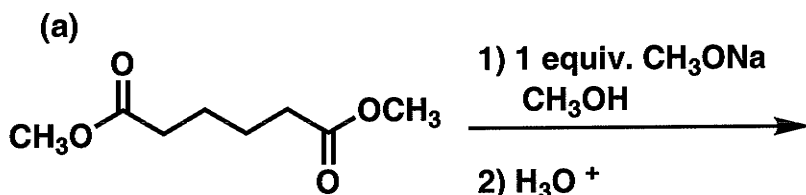


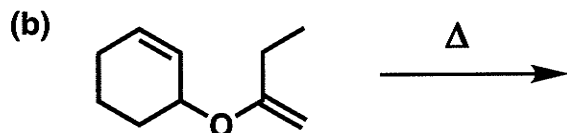
**General Instructions:**

- (i) Use scratch paper at back of exam to work out answers; final answers must be recorded at the proper place on the exam itself for credit.
- (ii) Print your name on each page.

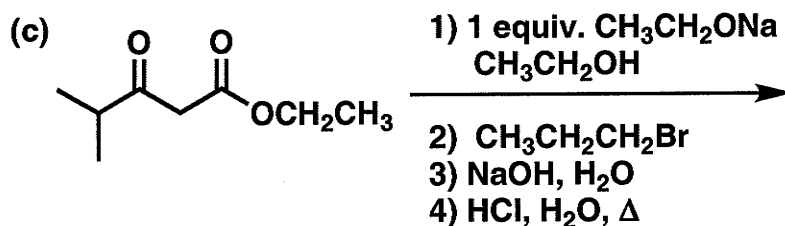
1. (18 points) Show the major product or products expected from each reaction:



[Hint: The product has strong IR signals at  $1750$  and  $1725\text{ cm}^{-1}$ , but the starting material has only the signal at  $1750\text{ cm}^{-1}$ .]



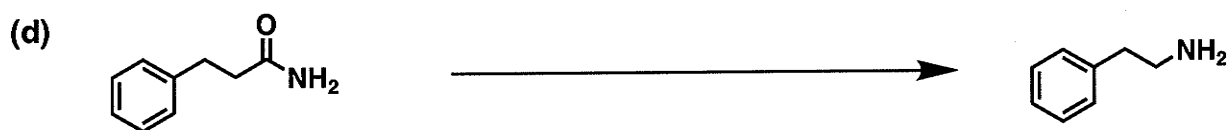
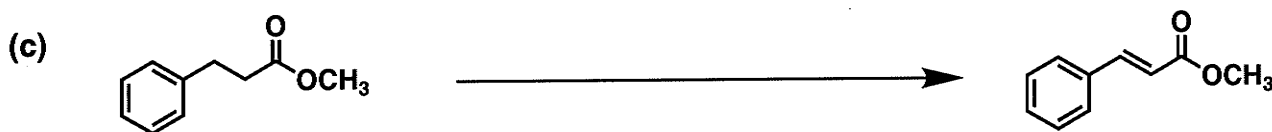
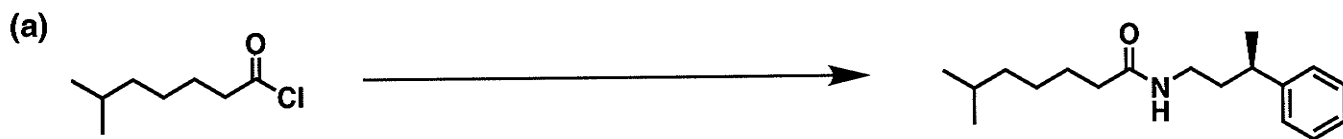
[Hint: The product has a strong IR signal at  $1715\text{ cm}^{-1}$ , but the starting material has no strong IR signal between  $1700$  and  $1750\text{ cm}^{-1}$ .]



[Hint: The product has a strong IR signal at  $1720\text{ cm}^{-1}$ ; the starting material has a similar signal, along with a signal at  $1745\text{ cm}^{-1}$ , which is lacking in the product.]

Name \_\_\_\_\_

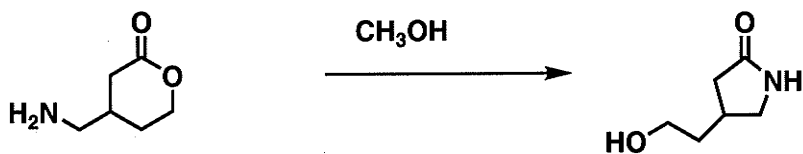
2. (30 points) Show the reagents and other organic molecules required to convert the starting material to the indicated product. Be sure to differentiate clearly between distinct steps by using "1)", "2)", etc.



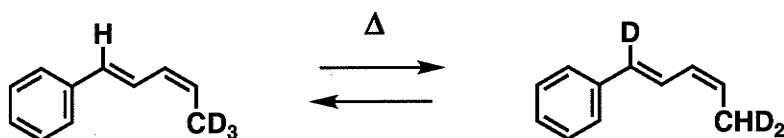
Name \_\_\_\_\_

3. (20 points) Draw out a mechanism ("curved arrows") for each reaction shown below. Be sure to show all important resonance structures in intermediates.

(a)

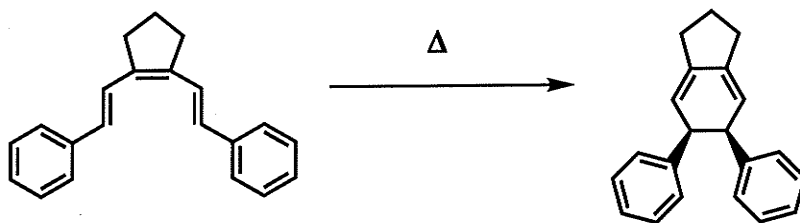


(b)



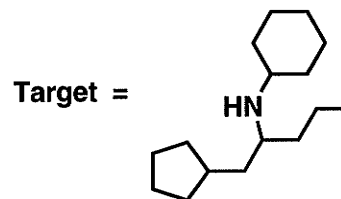
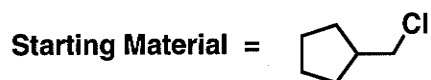
Name \_\_\_\_\_

4. (12 points) Rationalize the stereochemical preference observed in the reaction below, based on molecular orbital considerations.



Name \_\_\_\_\_

5. (20 points) Propose an efficient synthetic route to prepare the indicated target molecule from the indicated starting material and any other organic molecules necessary. Your route should be as short as possible, and each step should be as selective as possible.



Name \_\_\_\_\_

<u>Problem #</u>	<u>Score</u>
1	/ 18
2	/ 30
3	/ 20
4	/ 12
5	/ 20

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**Total:**

**/ 100**