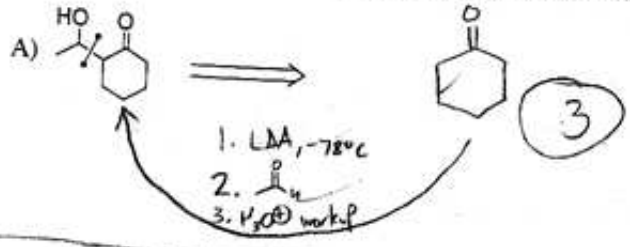
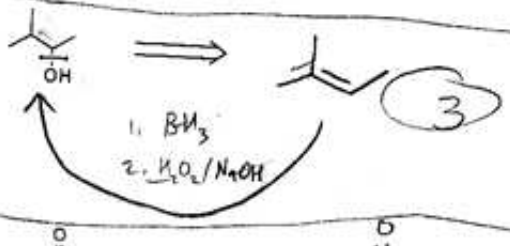
1) Retrosynthetic disconnections are shown below. Provide the precursors or precursors and reagents required to synthesize these molecules via these disconnections ***in one pot*** (3 pts each).

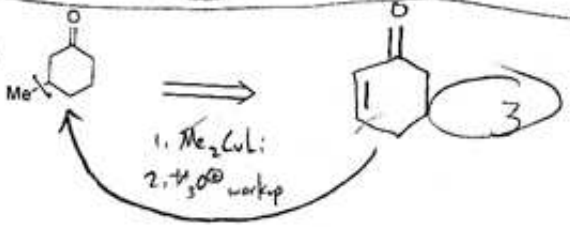
A)



B)

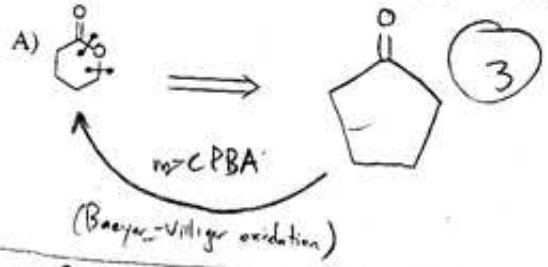


C)

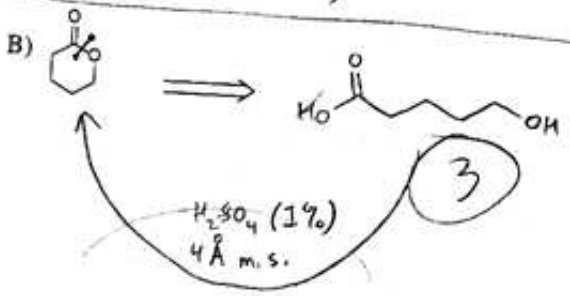


2) For the molecule shown below provide two **different** retrosynthetic disconnections and show the precursors required to synthesize this molecule via your disconnections. If you provide different variations of the same disconnection, you will only get credit for one. (3 pts each).

A)

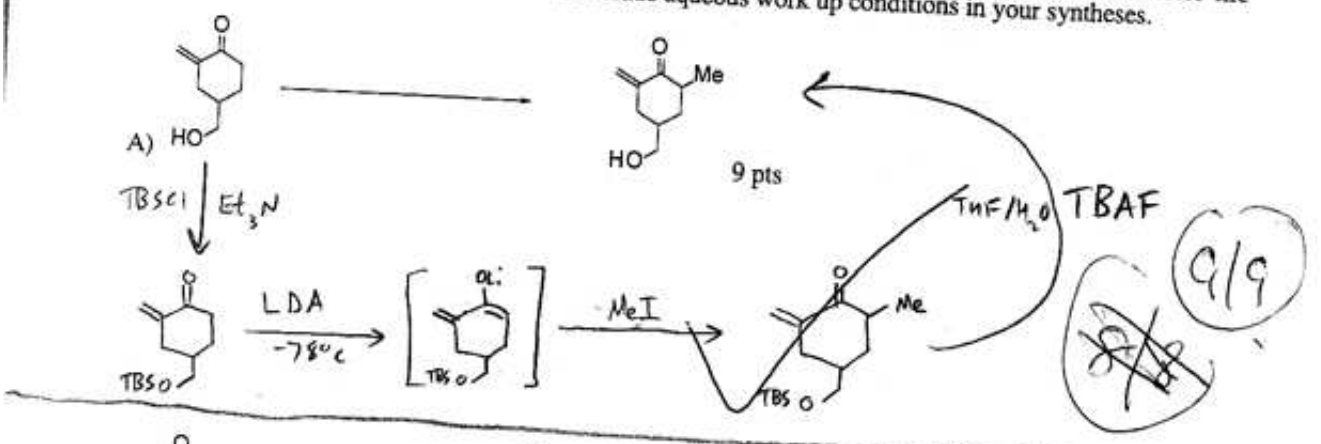


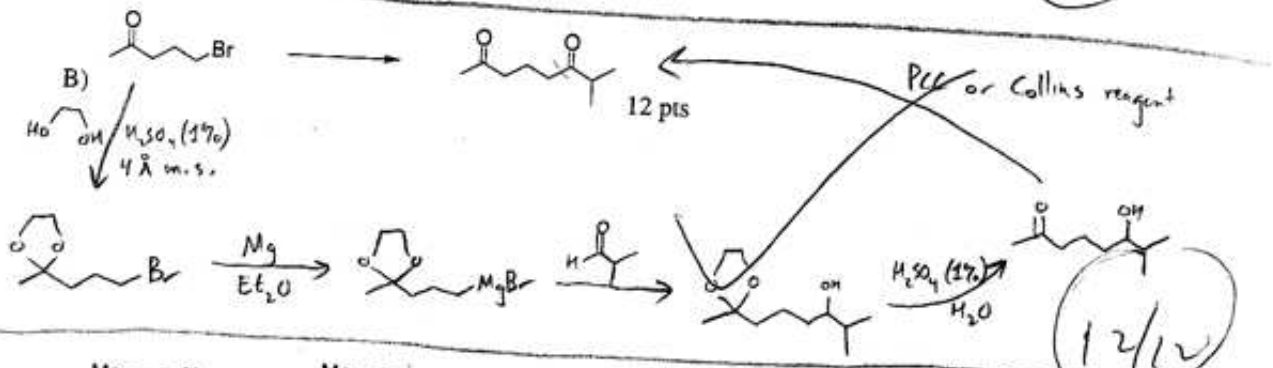
B)

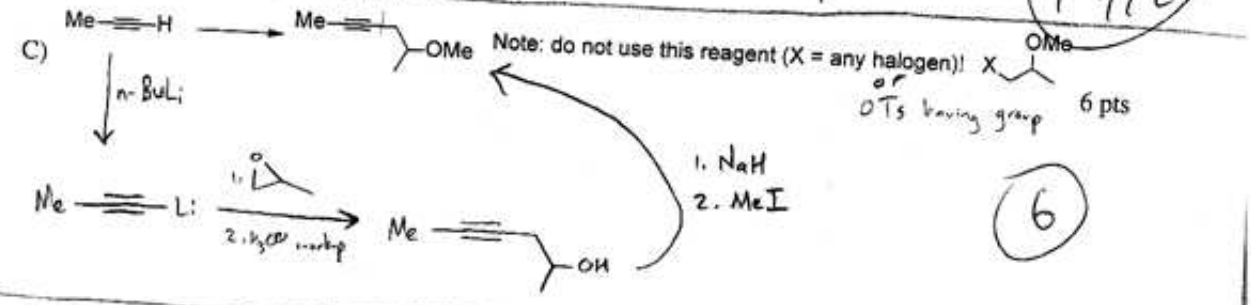


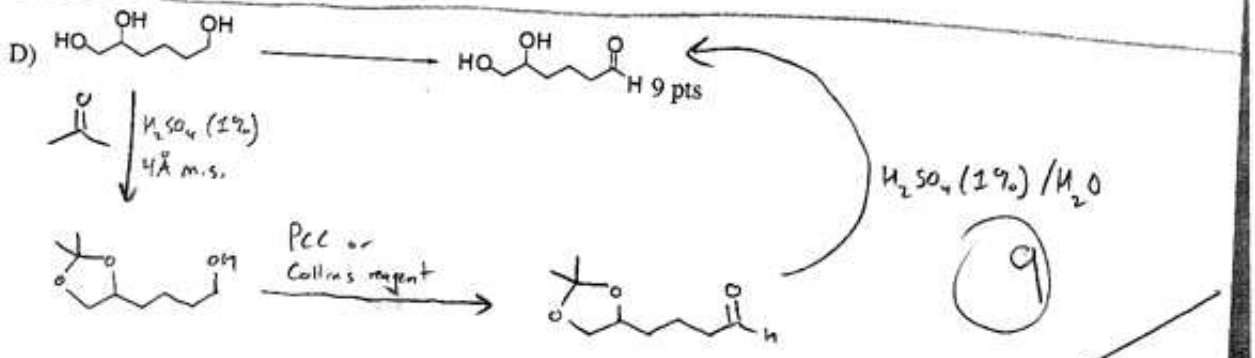
15

3) Complete the syntheses shown below using common organic and inorganic reagents. be sure to include protecting groups wen required. If your synthesis requires more than one step, **you must write the product of each step**. You do not have to include aqueous work up conditions in your syntheses.









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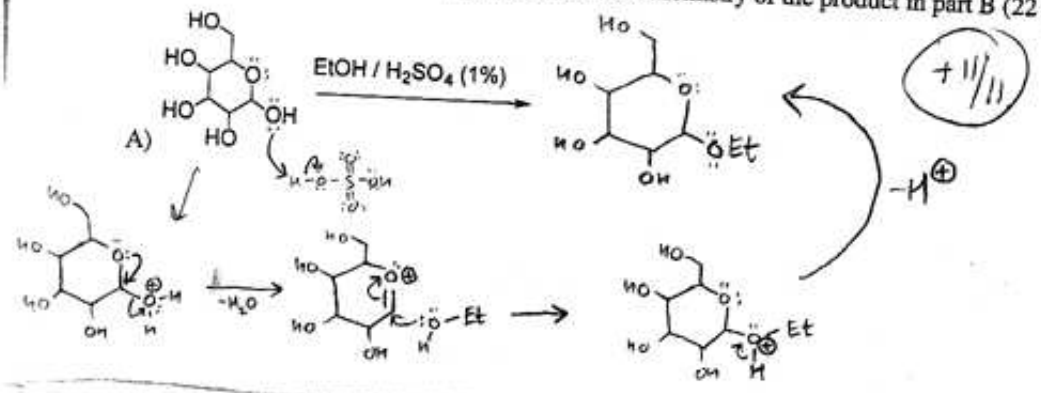
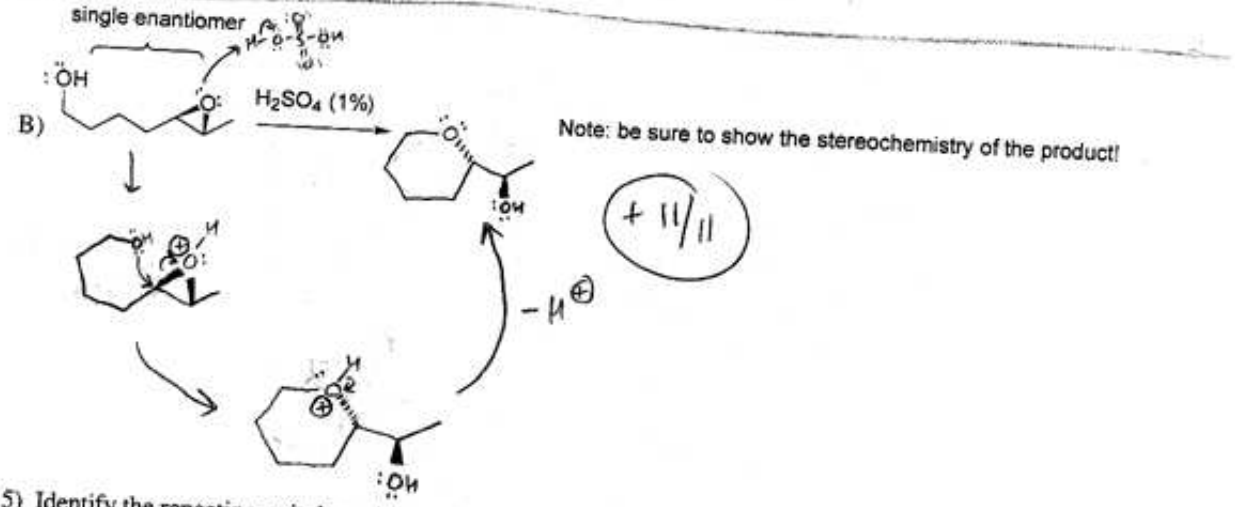
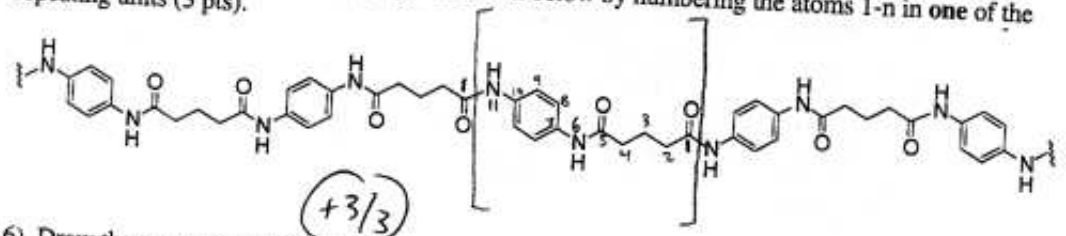
4) Provide the product and mechanisms for the reactions shown below. Be sure to show all intermediates, arrows, and charges, etc. Also, provide the stereochemistry of the product in part B (22 pts total)





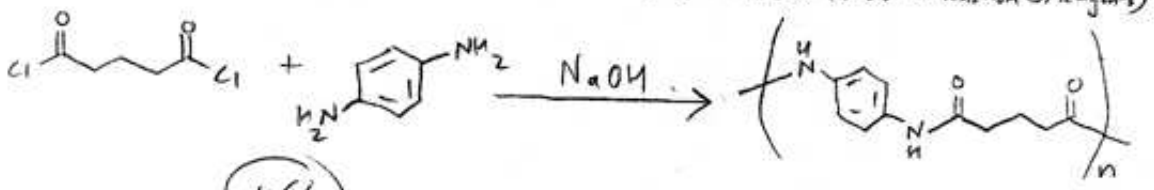
Note: be sure to show the stereochemistry of the product!

5) Identify the repeating unit the polymer shown below by numbering the atoms 1-n in **one** of the repeating units (3 pts).



+3/3

6) Draw the monomer or monomers you would use to make this polymer (6 pts) (show the reaction w/ reagents)



+6/6

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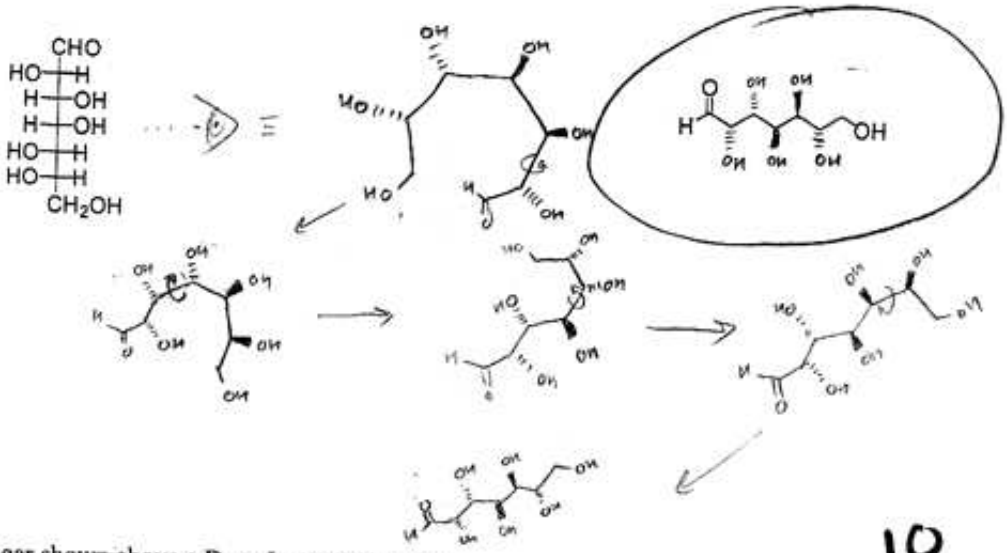
7) Convert the Fisher projections shown below to the zig-zag conformation (10 pts).



10

8) Is the sugar ~~shown above~~ a D- or L- sugar (2 pts)?

L-Sugar

2

9) Certain bacteria contain an enzyme called transpeptidase which cross-links bacterial cell walls. Do the β-lactam antibiotics such as penicillin inhibit this enzyme (yes or no, 2 pts)?

Yes

2

10) Certain bacteria contain an enzyme called β-lactamase which hydrolyzes β-lactams. Do the β-lactam antibiotics such as penicillin inhibit this enzyme (yes or no, 2 pts)?

No

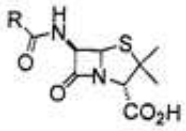
2

11) Are the β-lactams more or less reactive towards nucleophilic attack than ordinary amides (indicate more or less, 2 pts)?

More

2

The structure of penicillin is shown below



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