Name: _____ SID: _____

Signature: _____ 3BL GSI Name: _____

PRINT YOUR NAME CLEARLY!!

Lecture Only: _____

Completing an I Grade: _____

Chem 3B Su07 **Final Exam** **16AUG07**
Neil O.L. Viernes

This exam has 18 pages; **make sure you have them all.** Page 15 is blank. Use as scratch paper, anything written on it will NOT be graded. Pages 16-18 are tables to assist you with the exam.

Please place answers in designated spaces. **Please write clearly.** Messy or ambiguous answers will not be graded.

This exam runs 115 minutes. No clarifying questions will be answered by the GSI's after the exam begins.

Do not write in this box

1) _____ (12)	**11) _____(16)**
2) _____ (10)	**12) _____(16)**
3) _____ (12)	**13) _____(9)**
4) _____ (12)	
5) _____ (21)	
6) _____ (15)	
7) _____ (15)	
8) _____ (18)	
9) _____ (36)	
10) _____ (28)	

Total: _____ (220)

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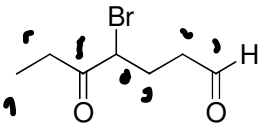
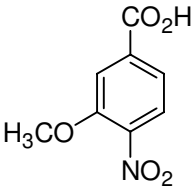
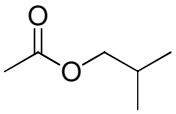
1) (12 pts)
Provide nomenclature or structures for the following:



4-bromo-5-oxo-heptanal



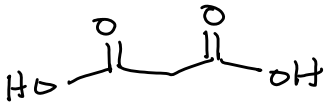
3-Methoxy-4-Nitrobenzoic Acid



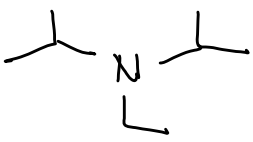
2-methylpropyl Acetate
or Ethanoate

3,5-Dimethylstyrene

Malonic Acid

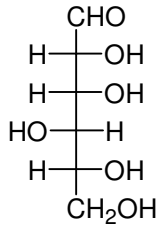


Diisopropyl ethylamine

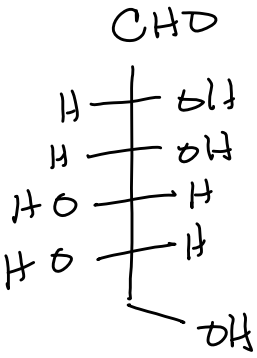


2) (10 pts)

Draw the epimer of D-(-)-Gulose where the sugar is converted to an L-Sugar



D-(-)-Gulose



What is the name of the L-Sugar

L-(-)-Mannose

Determine the charge of the following peptide at differing pH and calculate the pI (don't need to calculate the number, just show the math).

9.6 10.5 12.5 3.7 2.8

Val-Phe-Lys-Gln-Arg-Glu-Asp-Trp

4.3

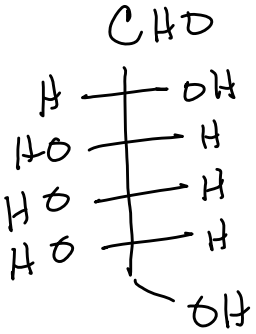
At pH = 7 | 0 |

At pH = 12 | −1 |

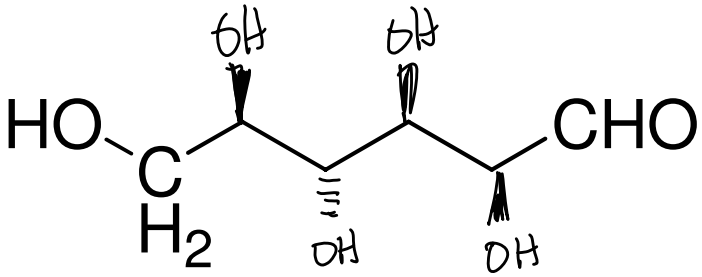
pI = | $\frac{9.6 + 4.3}{2}$ |

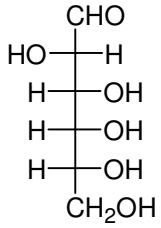
3) (12 pts)

Draw the structure for L-(-)-Altrose



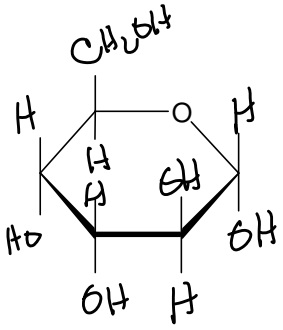
Convert D-(+)-Altrose into the zig-zag wedge confirmation

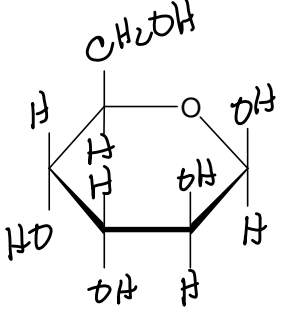




D-(+)-Altrose

Draw the Haworth Projection of the pyranose form of D-(+)-Altrose





4) (12 pts)

An unknown 30-residue peptide was digested with 3 different enzymes. The sequence of each fragment was determined by Edman degradation. Determine the sequence of the unknown peptide. Use the fragments (labeled a through f) from the Trypsin digestion as your answer (i.e. final sequence is a-b-c-d-e-f)

Chymotripsin Digestion
Glu-Asp-Ile-Lys-His-Gly-Trp
Asp-Met
Glu-Lys-Gly-Arg-His-Val-Glu-Met-Gly-Met-Leu-Glu-Gly-His-Lys-Leu-Tyr
Gly-Asp-Phe
Arg-Ile-Gly-Tyr

Trypsin Digestion

His-Gly-Trp-Arg	(a)
Leu-Tyr-Asp-Met	(b)
Ile-Gly-Tyr-Glu-Lys	(c)
His-Val-Glu-Met-Gly-Met-Leu-Glu-Gly-His-Lys	(d)
Gly-Asp-Phe-Glu-Asp-Ile-Lys	(e)
Gly-Arg	(f)

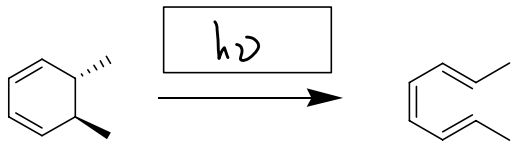
Thermolysin Digestion
Ile-Lys-His-Gly-Trp-Arg
Leu-Tyr-Asp-Met
Gly-Asp-Phe-Glu-Asp
Leu-Glu-Gly-His-Lys
Val-Glu-Met-Gly-Met
Ile-Gly-Tyr-Glu-Lys-Gly-Arg-His

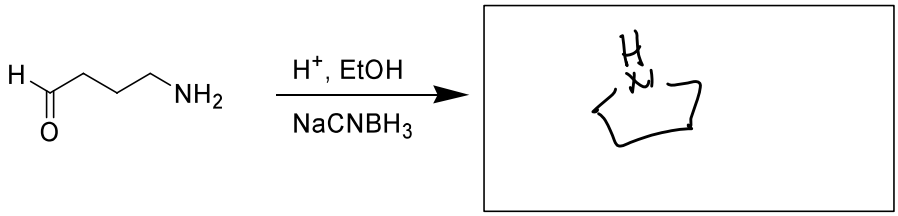
Answer:

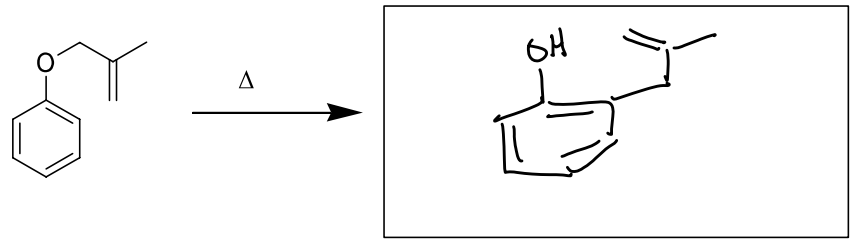
e - a - c - f - d - b

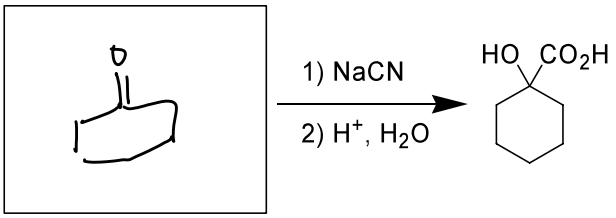
5) (21 pts)

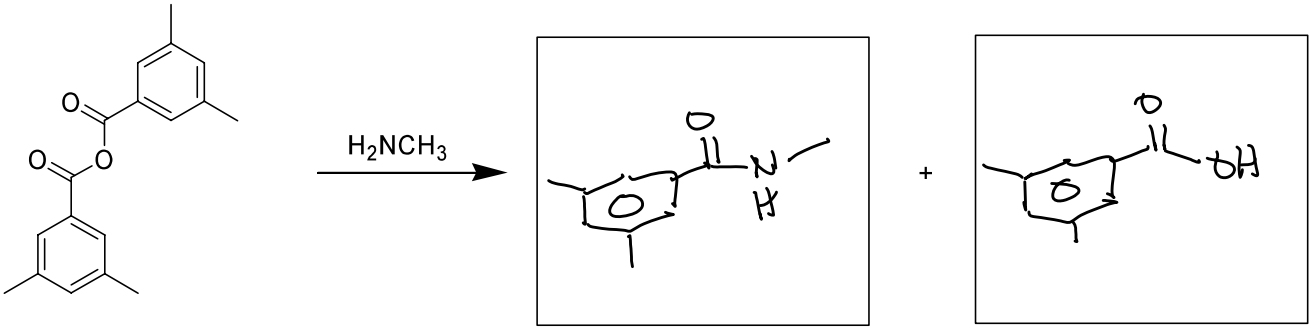
Fill in the missing reagent, starting material or product. One reaction step, or compound per box.

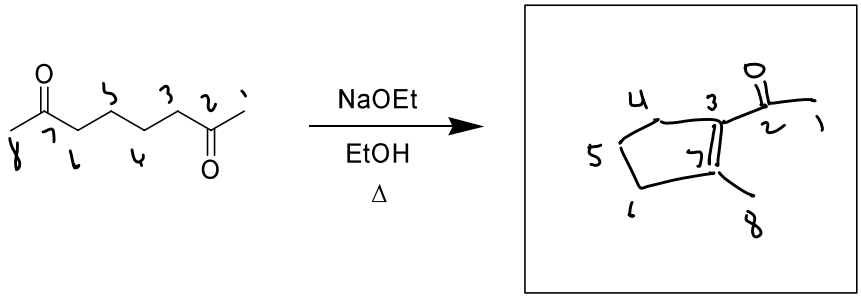




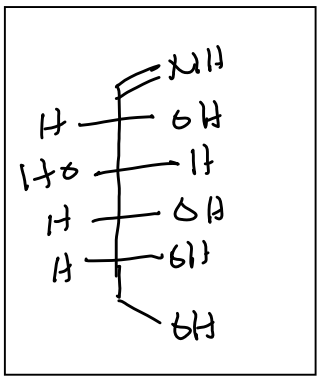








6) (15 pts)
Complete the synthetic roadmap.



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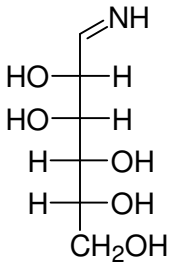


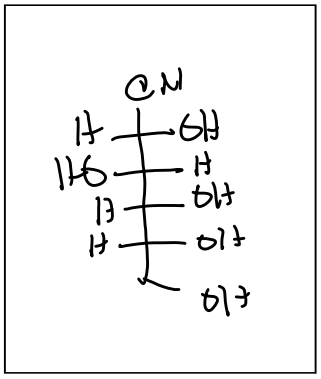
H^+, H_2o

D-(+)-Mannose

+

D-(+)-Glucose

H_2, Pd-$BaSO_4$
H^+, H_2O, 4 atm



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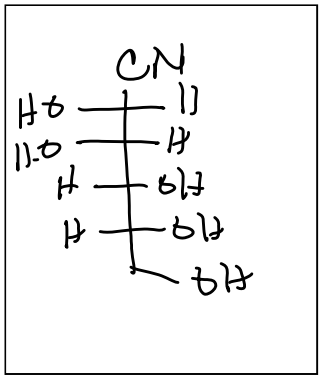
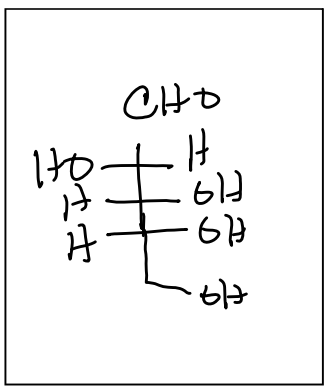
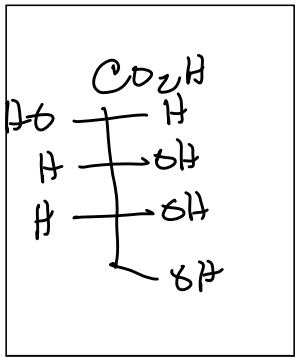


HCN



Br_2, H_2O



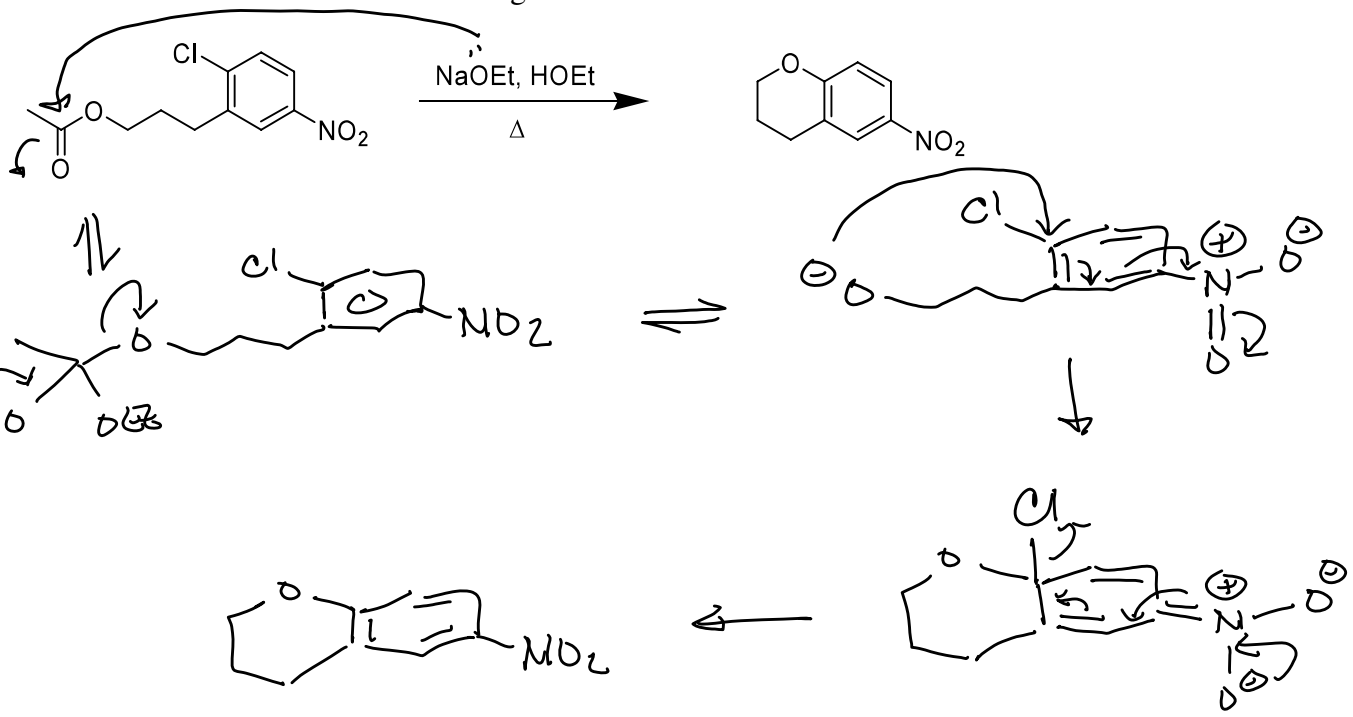
Fe^{3+}, H_2O_2
H_2O

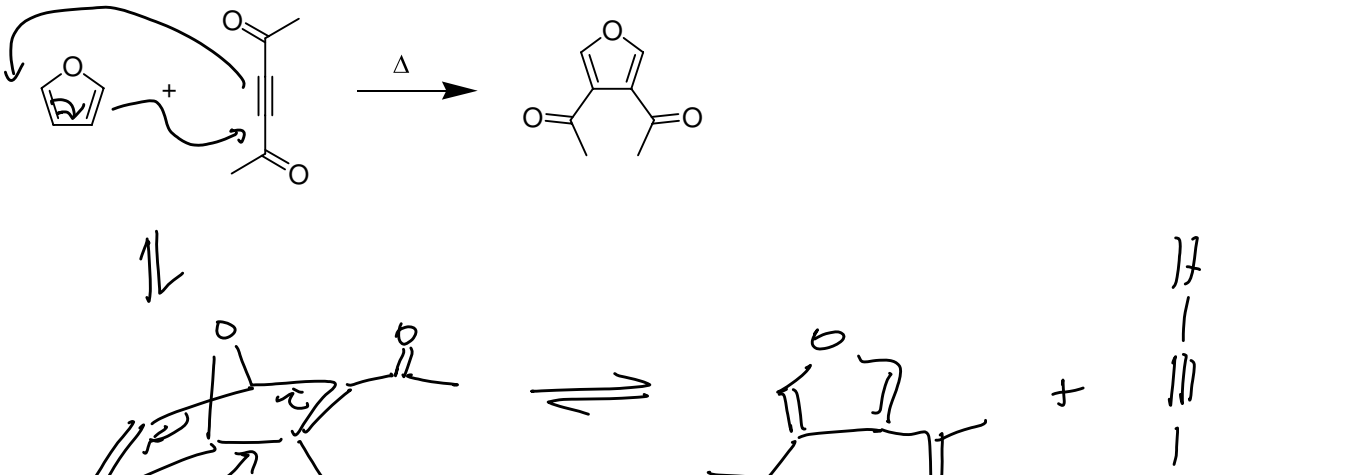
D-(-)-Erythrose

18

7) ~~(15 pts)~~

Provide a mechanism for the following transformations.

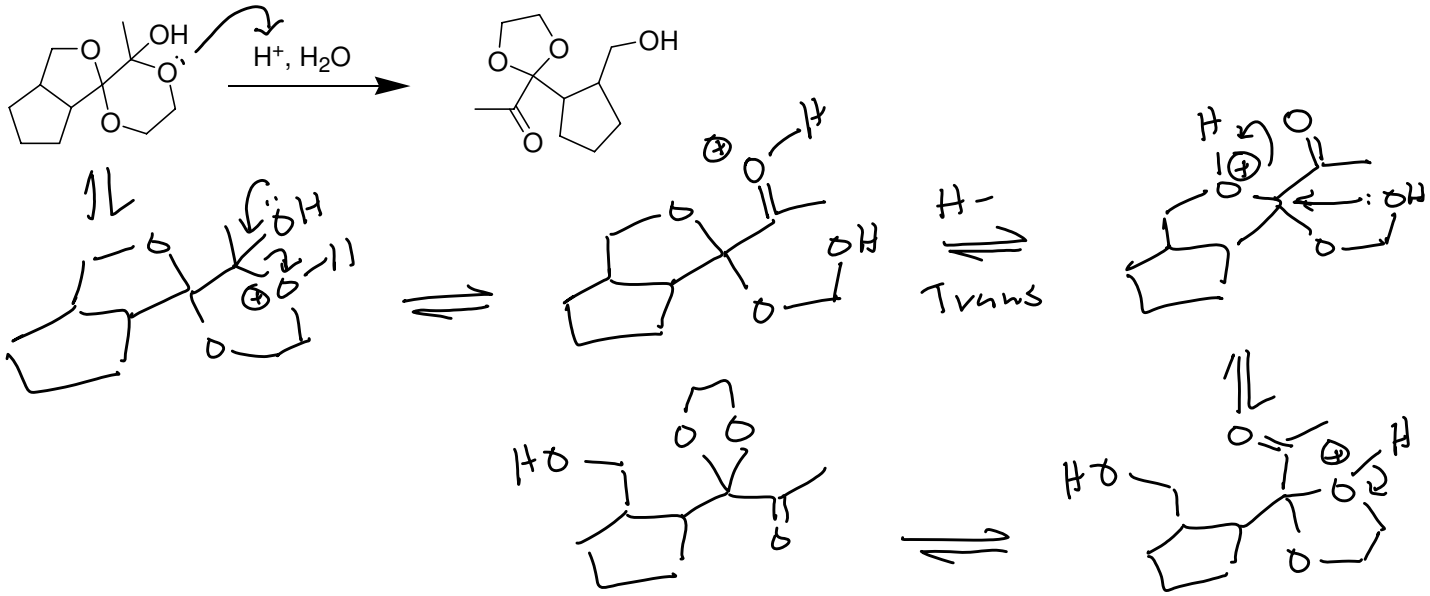




15

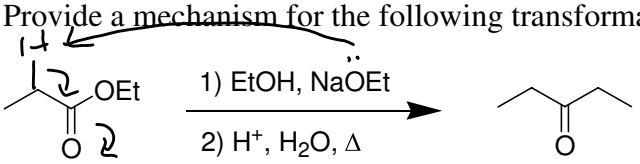
8) **~~(18~~ pts)**

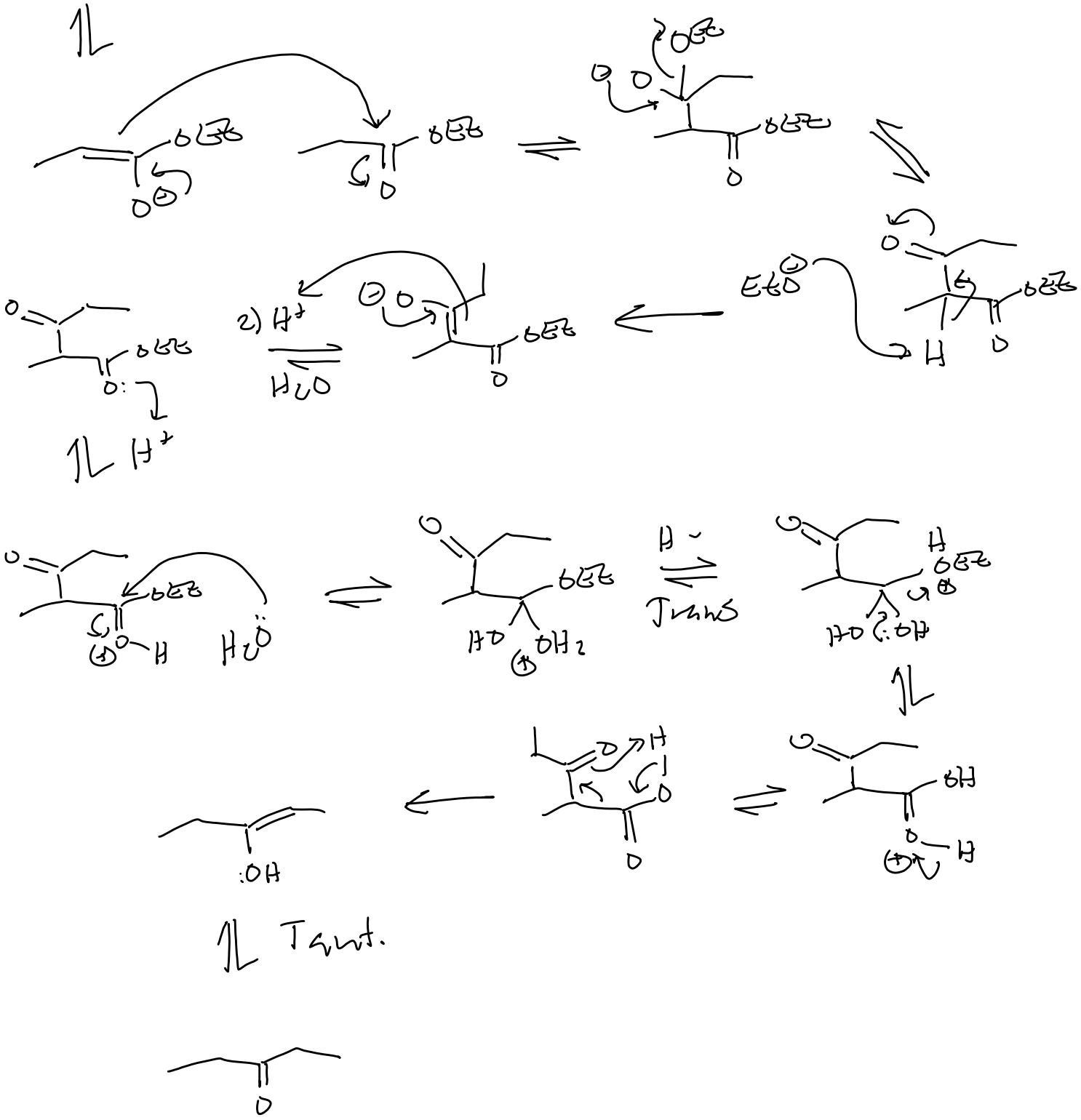
Provide a mechanism for the following transformation.



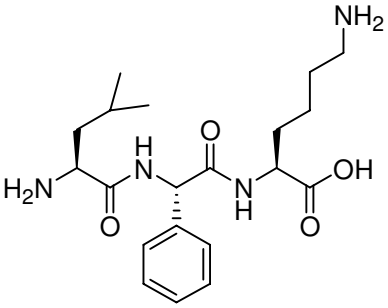
9) (36 pts)

Provide a mechanism for the following transformation.





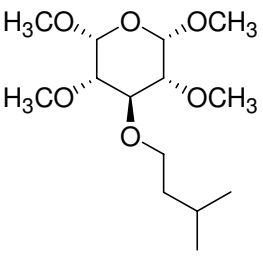
10) (28 pts)
Provide the best synthetic route to the following molecules.



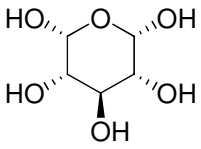
From any protected α-amino acid. Clearly indicate the protecting group on the side chain, N- and C-Terminal ends

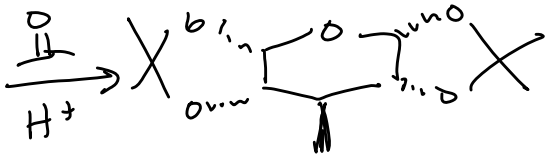
Boc-Phe + Lys(CBz) – OBn
↓ DCC
Boc-Phe-Lys(CBz)-OBn
↓ TFA [α-amino Deprotection only]
Phe-Lys(CBz)-OBn
↓ CBz-Leu, DCC
CBz-Leu-Phe-Lys(CBz)-OBn
↓ H_2/Pd(c) [Deprotection]
Leu-Phe-Lys

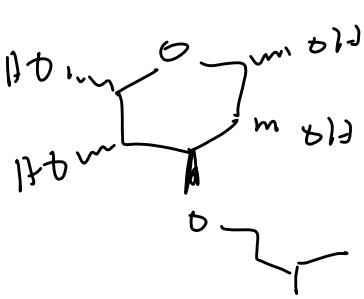
* Credit given to any appropriate protection scheme where ____ is not removed by ____ deprotection conditions

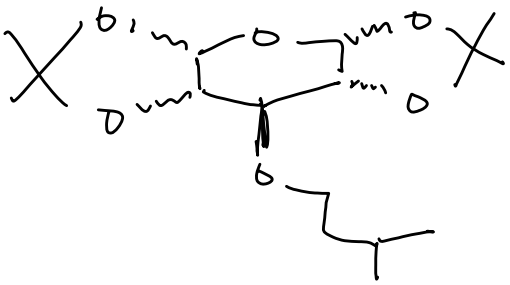


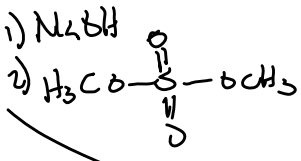
From

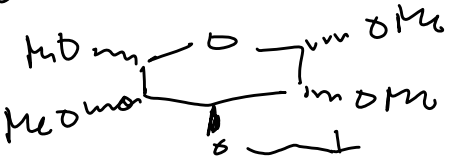






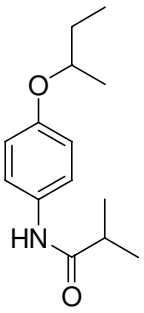




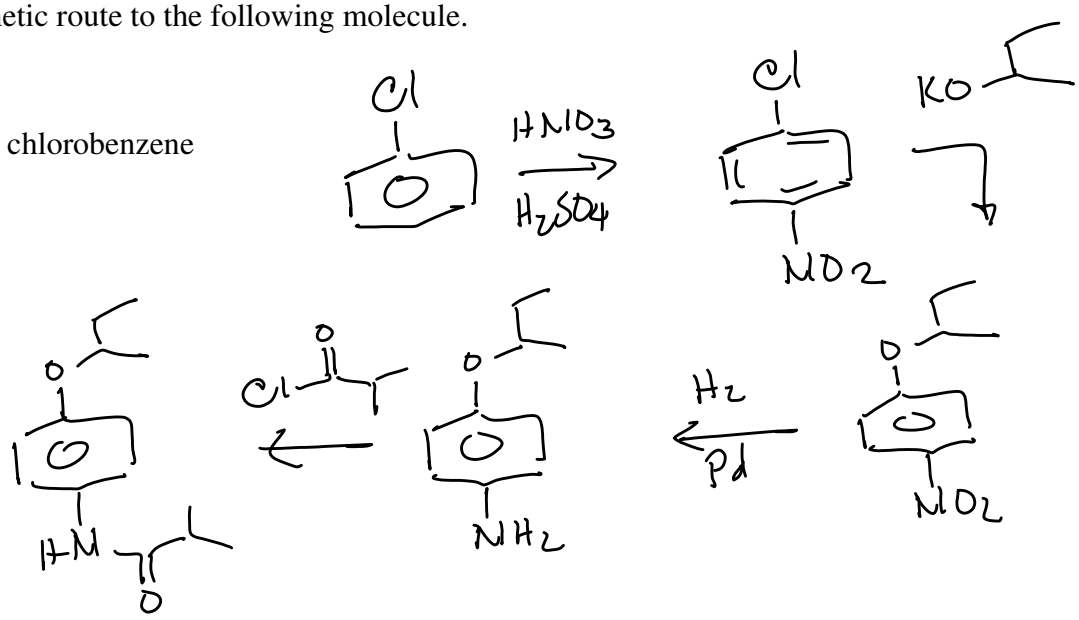


11) (16 pts)

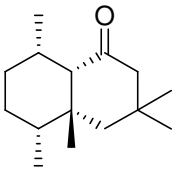
Provide the best synthetic route to the following molecule.

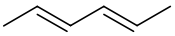


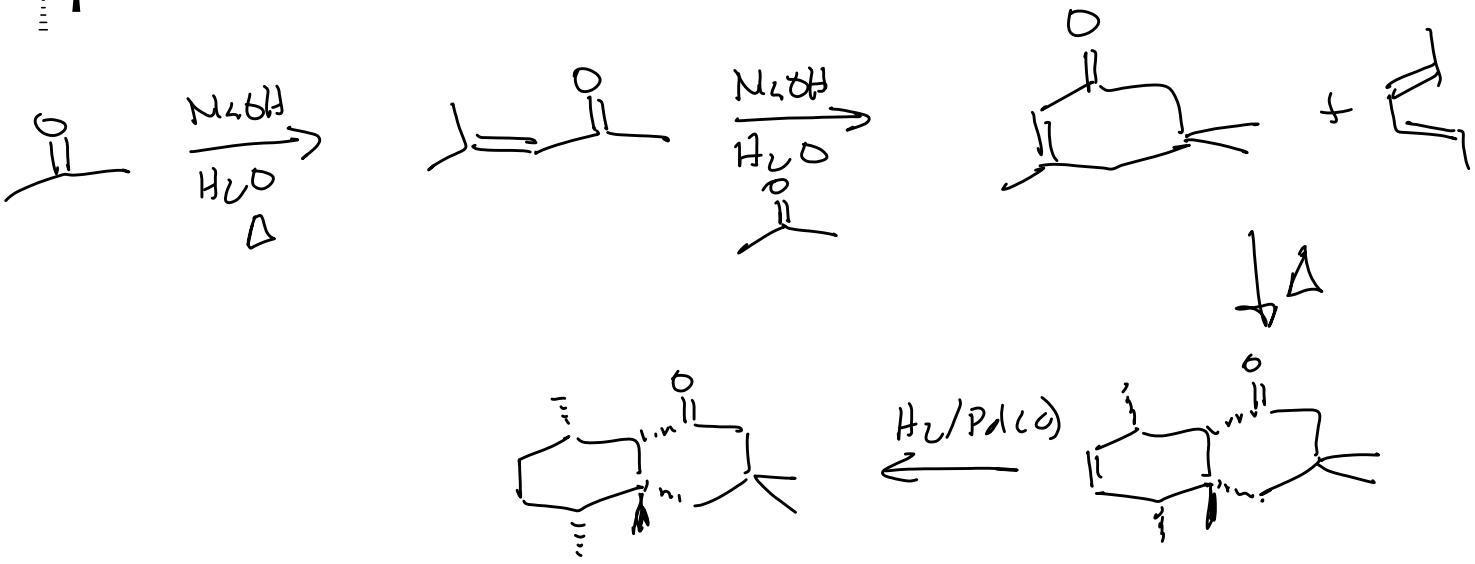
From chlorobenzene



12) (16 pts)
Provide the best synthetic route to the following molecule

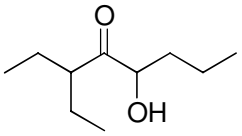


From  And acetone as only sources of carbon



13) (9 pts)

Provide the best synthetic route to the following molecule



From butanal