Name **Last name** **ID number**

1. (6 points)

(a) Draw fully (including sidechains and stereochemistry), any dipeptide using two different amino acids. Identify and indicate the hybridization of all the atoms involved in the amide bond. Briefly explain why this bond has enhanced stability.

(b). Consider the following peptide.
SER-TYR-PRO-ASP-GLN-LEU-GLY-LYS-VAL-CYS-MET-ILE-GLU-SER-LEU-SER-THR-VAL

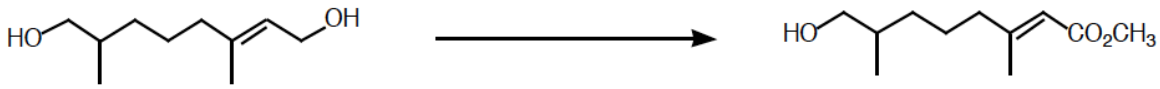
a. The peptide was treated with cyanogen bromide (BrCN), then sequenced by Edman degradation. Show where cyanogen bromide will cleave the peptide.

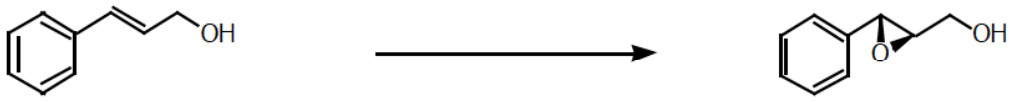
b. When the two fragments are sequenced, how do you know which fragment is from the C-terminal and N-terminal ends of the original peptide.

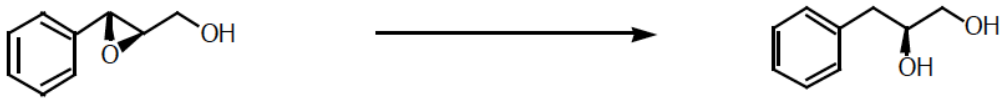
c. What is the reagent used for Edman degradation? For either of the fragment, draw the structure of the first product from Edman degradation.

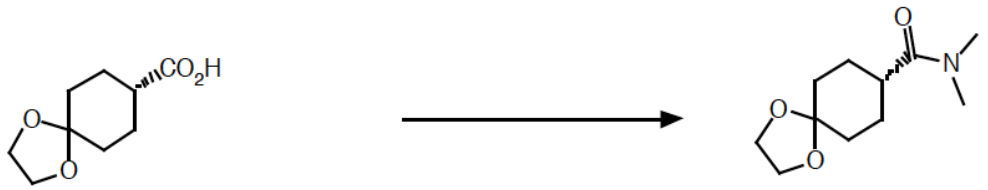
d. When the peptide is sequence by mass spectrometry, two of the fragments showed a mass loss of 128, which could be either lysine (LYS) of glutamine (GLN). How can these amino acids be differentiated when sequenced by mass spectrometry?

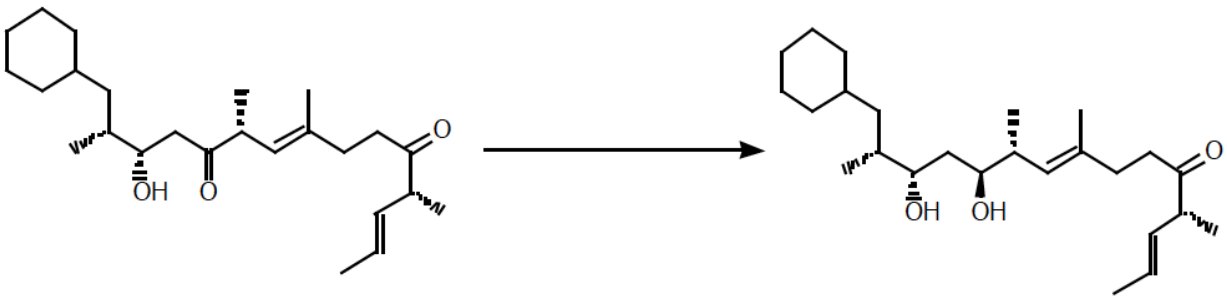
2. (5 points)
Give the reagent(s) necessary to carry out the following transformations. The stereochemistry of the products and reactants is as shown.



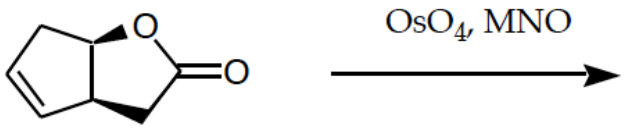


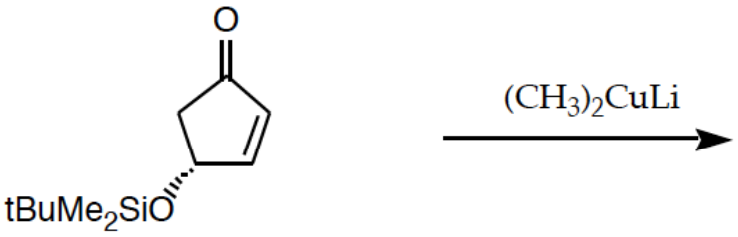


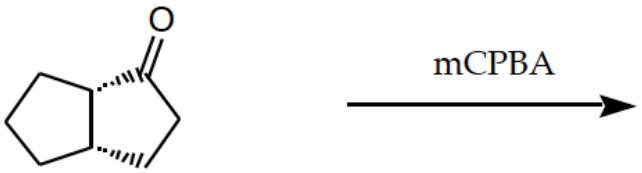


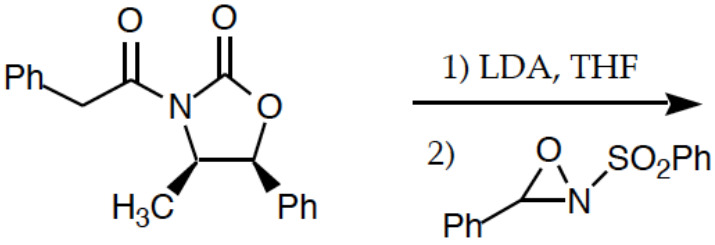


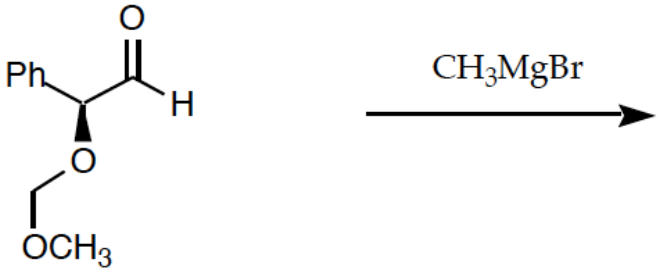
3. (5 points)
Give the product of the following reactions. The stereochemistry of the reactant is as shown.
Give the proper sterochemistry of the major steroisomer of the product.



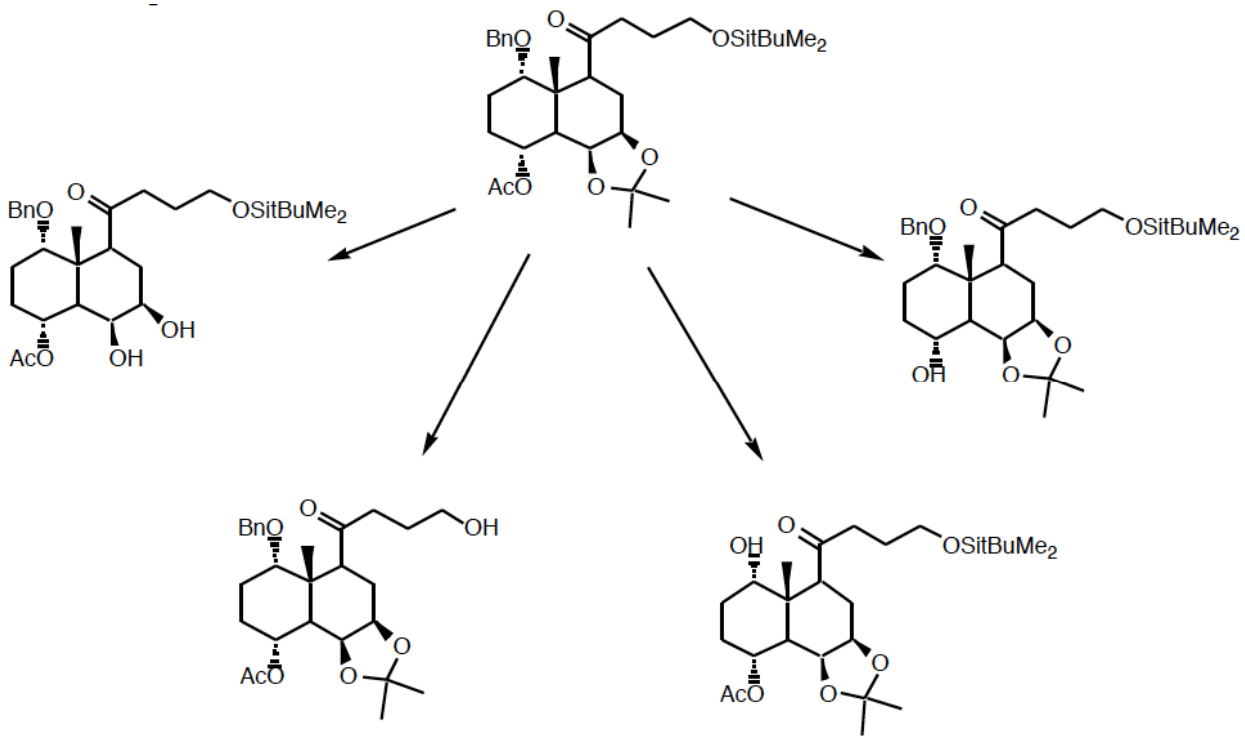




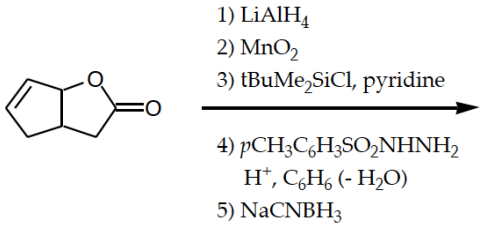




4. (4 points)
Give the reagent(s) needed to selectively deprotect the substrate below to the desired product.



5. (5 points)
Provide the product and all intermediates for the following sequence of reactions.



6. (5 points)
Complete the synthesis for the target shown. Give all reagents and intermediates.