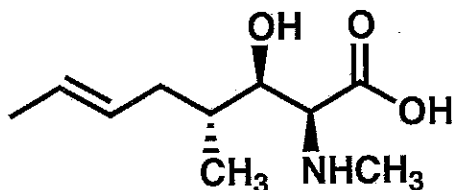


General Instructions:

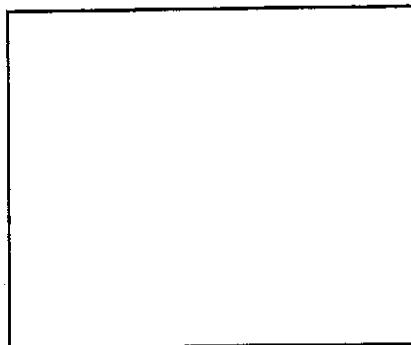
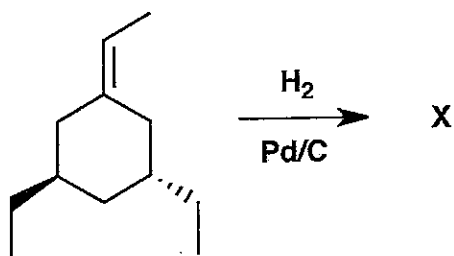
- (i) Use scratch paper at back of exam to work out answers; final answers must be recorded at the proper place on the exam itself for credit.
- (ii) Print your name on each page.
- (iii) Please keep your paper covered and your eyes on your own work. Misconduct will lead to failure in the course.

1. (9 points) The molecule shown below is a subunit found in cyclosporine, which is used to prevent rejection in transplant patients. CIRCLE each sp^3 stereogenic center (chiral center), and assign the configuration (R or S).



2. (25 points)

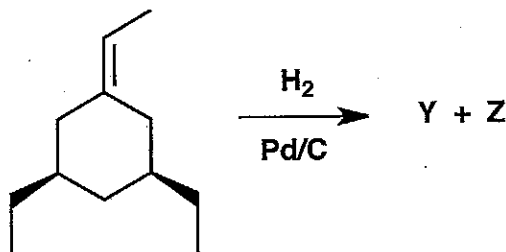
The reaction shown below produces only one product, X, whether the starting material is the single enantiomer shown or a racemic mixture. Provide the information requested below.



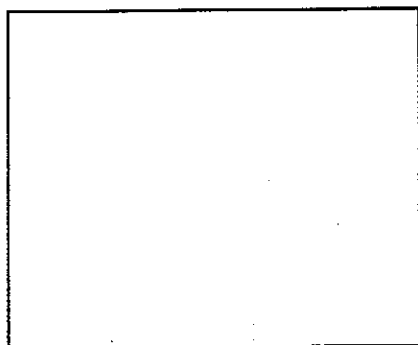
(a) Draw the structure of X in the box.

(b) Draw the two chair conformations available to X below, and CIRCLE the one you expect to be more stable.

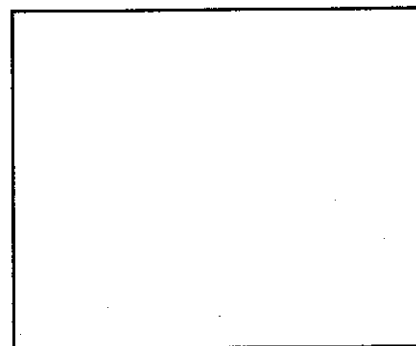
(c) The reaction shown below produces two products, Y and Z. Draw structures of these products in the boxes (the order does not matter). Under each box, indicate the stereochemical relationship of Y and Z (as you have drawn them) to X.



Y =



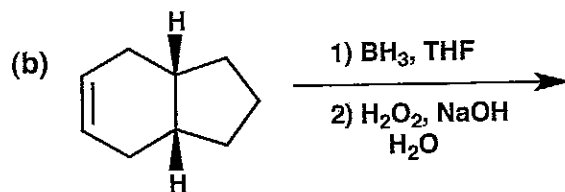
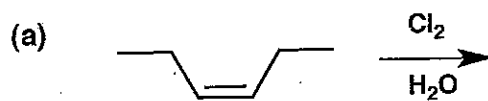
Z =



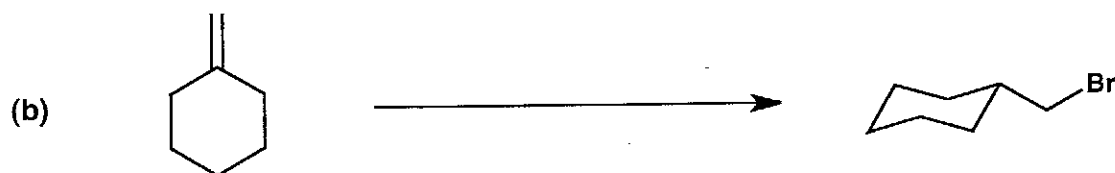
Relationship to X: _____

Relationship to X: _____

3. (14 points) Show the major product(s) expected from the reactions below.



4. (12 points) Show the reagents required to convert the starting molecule to the indicated product. If necessary, differentiate clearly between distinct steps by using "1)", "2)", etc. over or under the arrow.

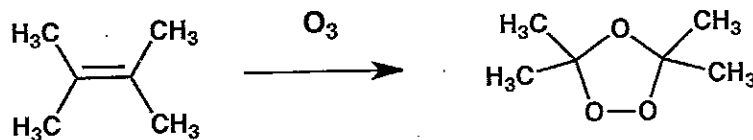


5. (18 points)

Name _____

00026

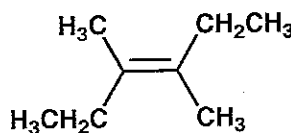
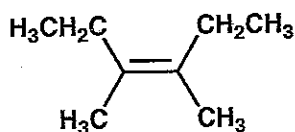
Background: Shown below the product that is isolated when the alkene below is allowed to react with ozone, but no additional reagents are used (as we discussed in lecture).



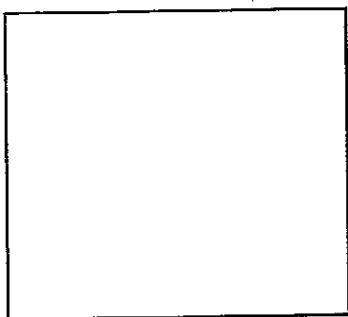
Question: When either of the alkenes shown below is allowed to react with ozone (only), three isomeric products are formed. The set of three products is the same, no matter which alkene is used as starting material.

Draw the structures of these three products in the boxes, and indicate the isomeric relationship between each one with the other two.

(Note: It does not matter how you place the products in boxes A, B and C, so long as the products are correct, and the relationships are correct.)



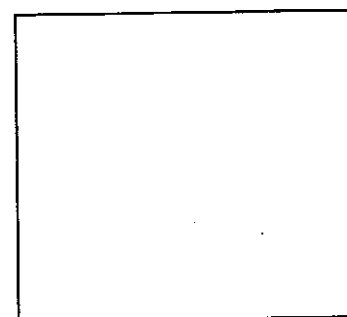
A



Rel. to B: _____

Rel. to C: _____

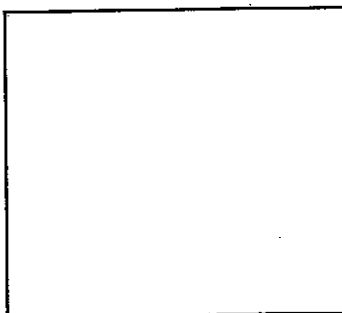
B



Rel. to A: _____

Rel. to C: _____

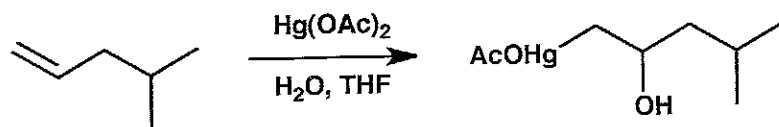
C



Rel. to A: _____

Rel. to B: _____

6. (12 points) Draw a mechanism (curved arrows) for each reaction shown below. Be sure to draw all intermediates, and to indicate any by-products that may not be shown in the equation.



7. (10 points) Draw all chiral stereoisomeric forms of dimethylcyclopentane (C_7H_{14}).

<u>Problem #</u>	<u>Score</u>
1	/ 9
2	/ 25
3	/ 14
4	/ 12
5	/ 18
6	/ 12
7	/ 10

Total: / 100

Periodic Table of the Elements

																		¹ H 1.008									
³ Li 6.94	⁴ Be 9.01																	² He 4.003									
¹¹ Na 22.99	¹² Mg 24.31																	¹³ Al 26.98	¹⁴ Si 28.09	¹⁵ P 30.97	¹⁶ S 32.06	¹⁷ Cl 35.45	¹⁸ Ar 39.95				
¹⁹ K 39.10	²⁰ Ca 40.08	²¹ Sc 44.96	²² Ti 47.90	²³ V 50.94	²⁴ Cr 52.00	²⁵ Mn 54.94	²⁶ Fe 55.85	²⁷ Co 58.93	²⁸ Ni 58.71	²⁹ Cu 63.55	³⁰ Zn 65.37	³¹ Ga 69.72	³² Ge 72.59	³³ As 74.92	³⁴ Se 78.96	³⁵ Br 79.90	³⁶ Kr 83.80										
³⁷ Rb 85.47	³⁸ Sr 87.62	³⁹ Y 88.91	⁴⁰ Zr 91.22	⁴¹ Nb 92.91	⁴² Mo 95.94	⁴³ Tc 98.91	⁴⁴ Ru 101.07	⁴⁵ Rh 102.91	⁴⁶ Pd 106.4	⁴⁷ Ag 107.87	⁴⁸ Cd 112.40	⁴⁹ In 114.82	⁵⁰ Sn 118.69	⁵¹ Sb 121.75	⁵² Te 127.60	⁵³ I 126.90	⁵⁴ Xe 131.30										
⁵⁵ Cs 132.91	⁵⁶ Ba 137.34	⁵⁷ La 138.91	⁷² Hf 178.49	⁷³ Ta 180.95	⁷⁴ W 183.85	⁷⁵ Re 186.2	⁷⁶ Os 190.2	⁷⁷ Ir 192.2	⁷⁸ Pt 195.09	⁷⁹ Au 196.97	⁸⁰ Hg 200.59	⁸¹ Tl 204.37	⁸² Pb 207.19	⁸³ Bi 208.98	⁸⁴ Po (209)	⁸⁵ At (210)	⁸⁶ Rn (222)										
⁸⁷ Fr (223)	⁸⁸ Ra (226.03)	⁸⁹ Ac (227)	¹⁰⁴ Uuq* (261)	¹⁰⁵ Uup* (262)	¹⁰⁶ Uuh* (263)	¹⁰⁷ Uus* (262)	¹⁰⁸ Uuo* (265)	¹⁰⁹ Uua* (266)																			
Lanthanides																											
Actinides																											
⁵⁸ Ce 140.12	⁵⁹ Pr 140.91	⁶⁰ Nd 144.24	⁶¹ Pm (145)	⁶² Sm 150.35	⁶³ Eu 151.96	⁶⁴ Gd 157.25	⁶⁵ Tb 158.93	⁶⁶ Dy 162.50	⁶⁷ Ho 164.93	⁶⁸ Er 167.26	⁶⁹ Tm 168.93	⁷⁰ Yb 173.04	⁷¹ Lu 174.97	⁹⁰ Th 232.04	⁹¹ Pa (231)	⁹² U 238.03	⁹³ Np (237)	⁹⁴ Pu (244)	⁹⁵ Am (243)	⁹⁶ Cm (247)	⁹⁷ Bk (249)	⁹⁸ Cf (249)	⁹⁹ Es (254)	¹⁰⁰ Fm (257)	¹⁰¹ Md (258)	¹⁰² No (259)	¹⁰³ Lr (260)

*Symbol (and name) provisional.

Numbers in parentheses: available radioactive isotope of longest half-life.