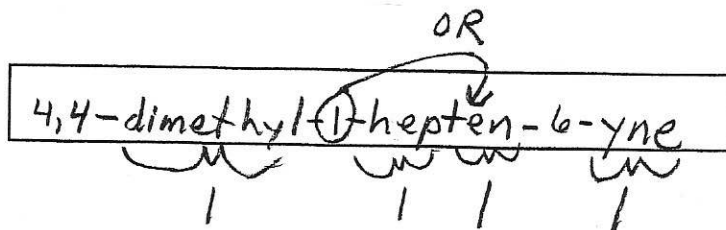
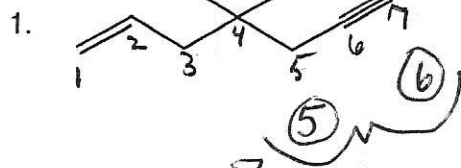


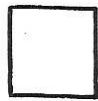
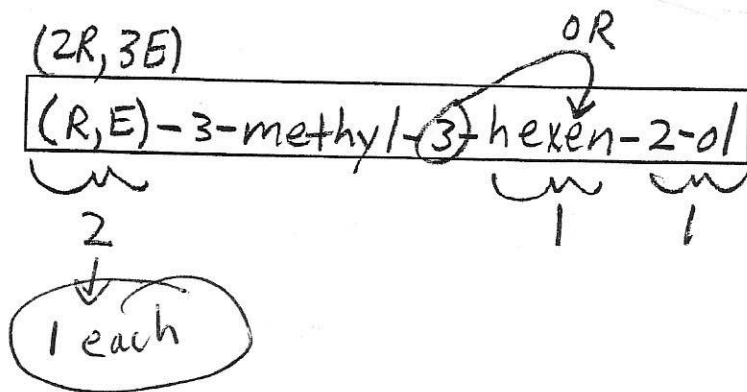
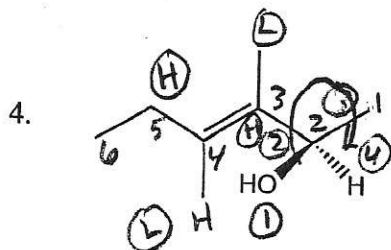
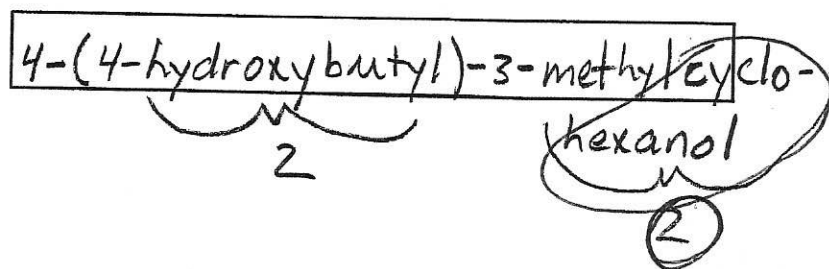
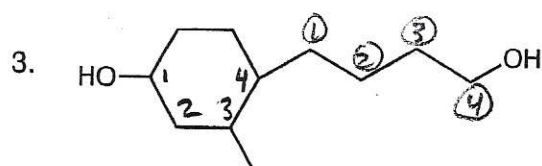
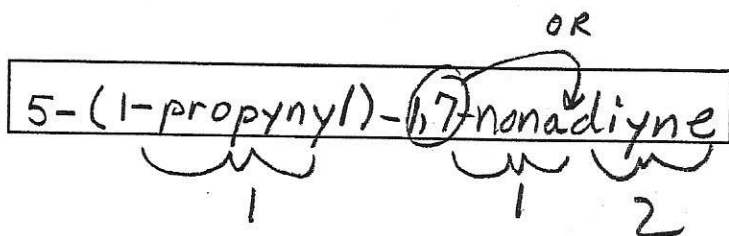
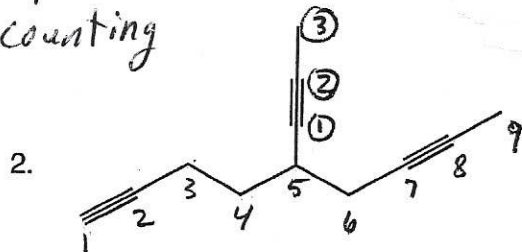
# Exam 3A Key

## A. Nomenclature: (16 points)

Give an acceptable IUPAC name for each of the following compounds. Be sure to include the stereochemistry when indicated and appropriate.

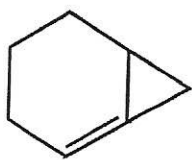


incorrect  
triple bond / line angle  
counting

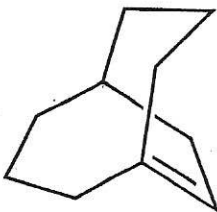


**B. FACTS: Total = 24 points**

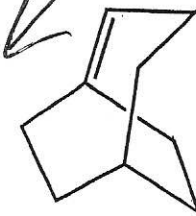
1. Label the alkenes as stable (S) or unstable (U). (6 points)



**U**



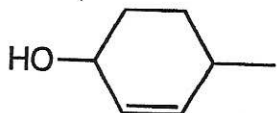
**S**



**U**

can't consider all (S) or all (U) guessing  
2pts/box

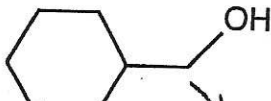
2. Place the alcohols in order of increasing reactivity in an acid catalyzed dehydration. (1=least reactive, 3=most reactive) (6 points)



**3**

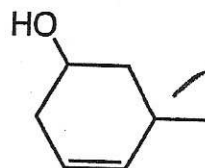


2° res stabilized



**1**

1° Ct

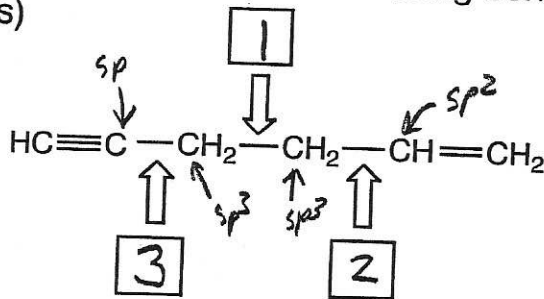


**2**

2° Ct

2pts/box

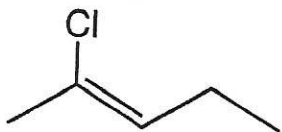
3. Place the indicated bonds in order of increasing bond strength. (1=weakest, 3=strongest) (6 points)



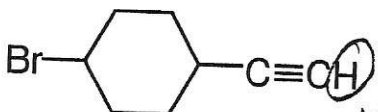
2pts/box

greater s character of hybrid orbital forming the bond, stronger the bond

4. Place a "Y" in the box below any halide that will produce a useful Grignard reagent. Place an "N" in the box below any that will not. (6 points)

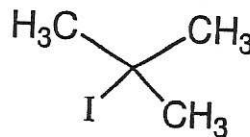


**Y**



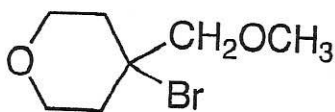
**N**

acidic H

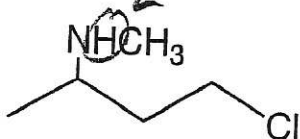


**Y**

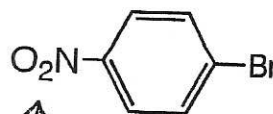
1 pt/box



**Y**



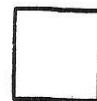
**N**



**N**

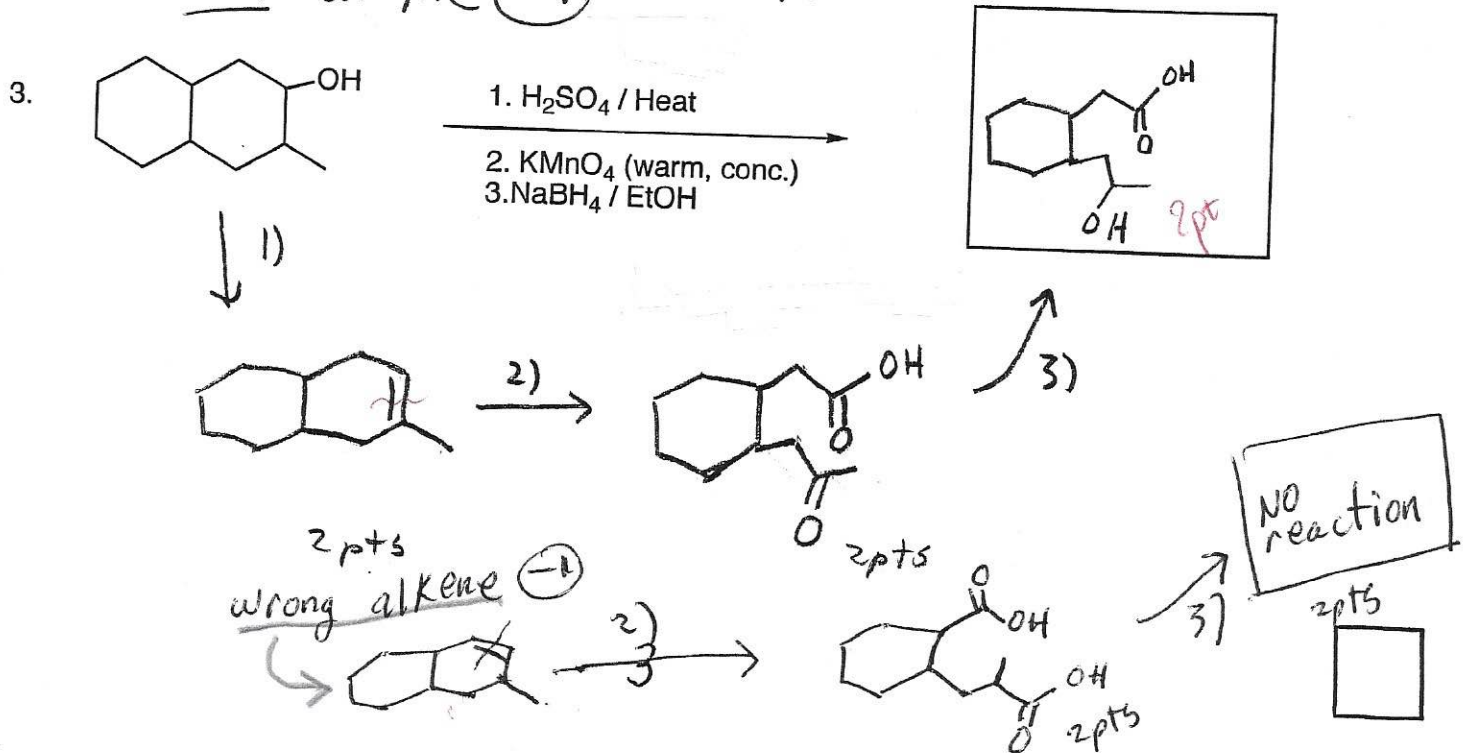
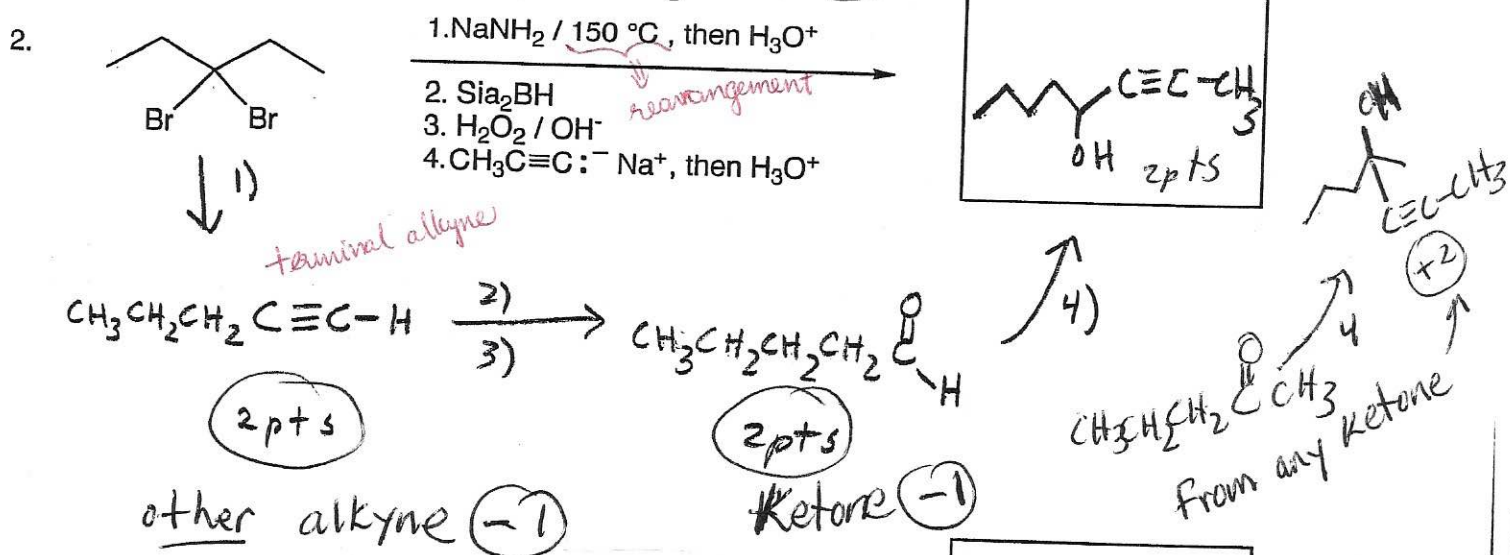
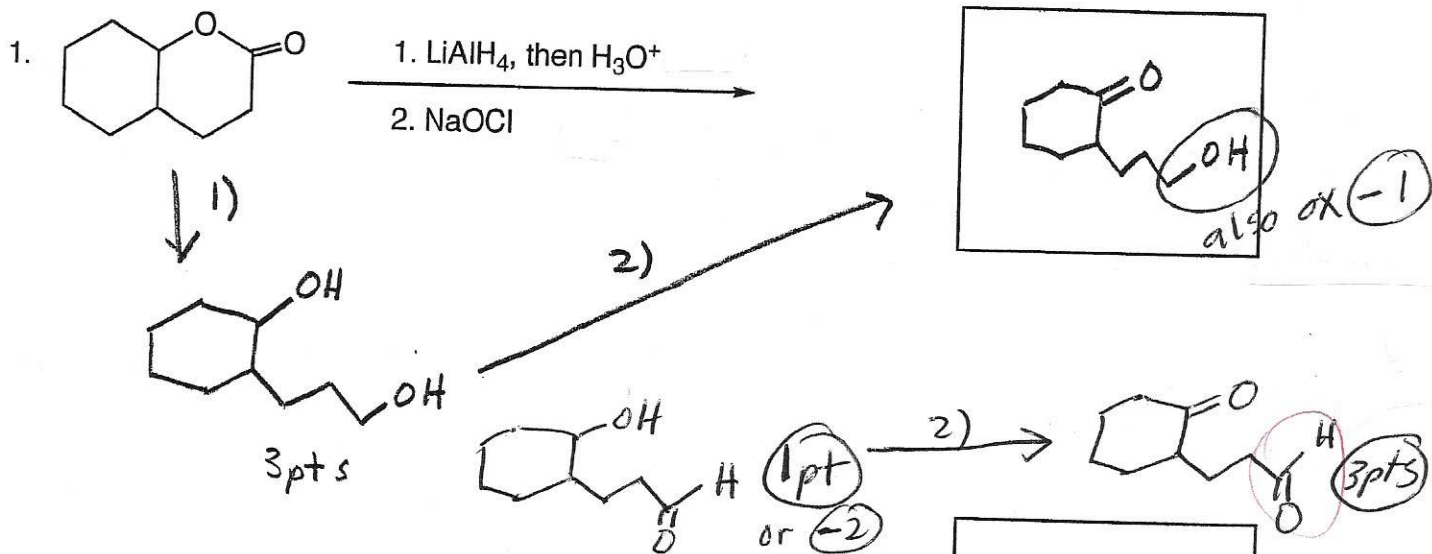
reacts with Grignard formed

\* can't consider all (Y) or all (N) guessing

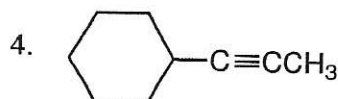


C. Reactions: Total = 36 points, 6 points each  
 Please provide the major product in the answer box. Indicate stereochemistry if applicable. Full credit is awarded only when the product of each step in a multi-step reaction is shown below the reaction.

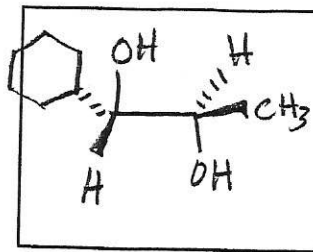
counting C (-1 pt)



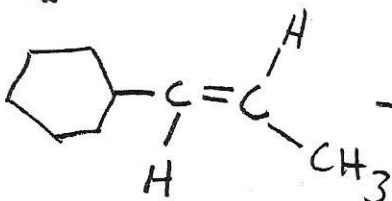
total for each = 6 points



1. Na / NH<sub>3</sub>  
2. MCPBA  
3. H<sub>3</sub>O<sup>+</sup>



(-1) if incorrect or NO stereo

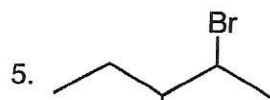


(-1) if incorrect or NO stereo

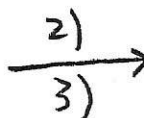
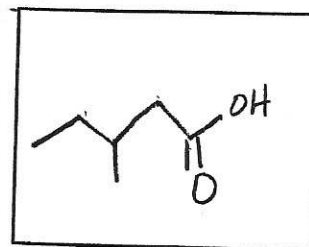
2pts

2)

2pts



1. (CH<sub>3</sub>CH<sub>2</sub>)<sub>3</sub>N  
2. BH<sub>3</sub>·THF  
3. H<sub>2</sub>O<sub>2</sub> / OH<sup>-</sup>  
4. CrO<sub>3</sub> / H<sub>2</sub>SO<sub>4</sub> / H<sub>2</sub>O / acetone / 0°C

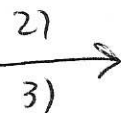


4

wrong alkene



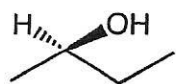
(-1)



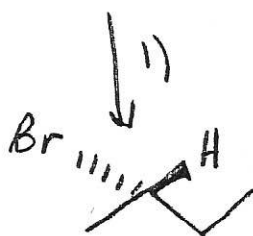
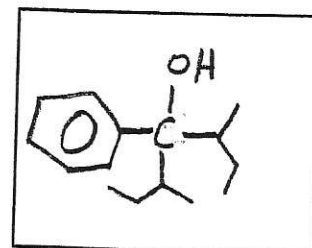
2pts

4)

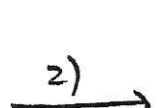
6.



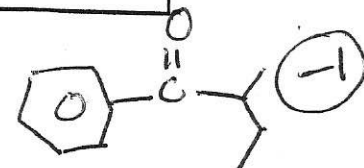
1. PBr<sub>3</sub>  
2. Mg / Et<sub>2</sub>O  
3. c1ccc(cc1)C(=O)Cl (0.5eq), then H<sub>3</sub>O<sup>+</sup>



2pts



2pts



(-1) incorrect stereo or NO stereo

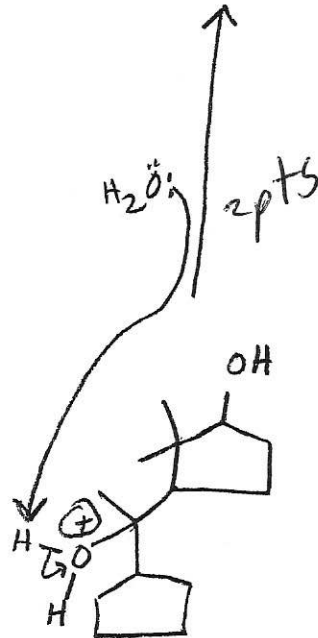
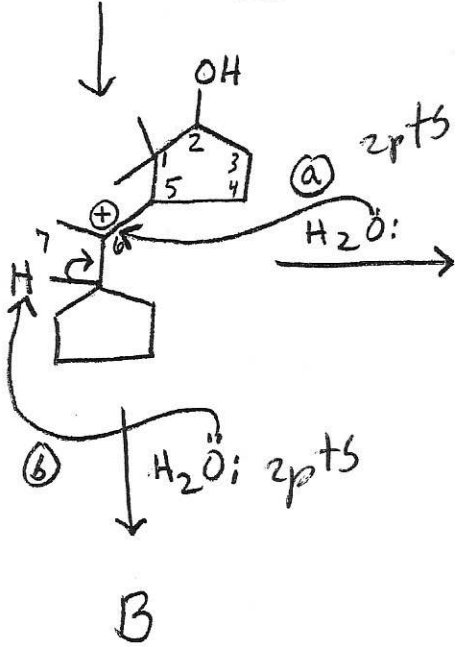
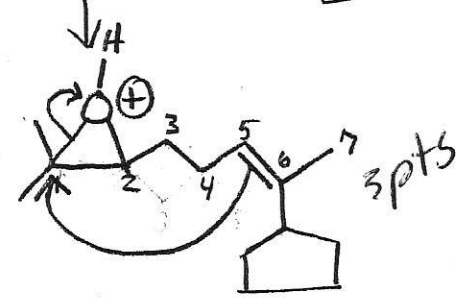
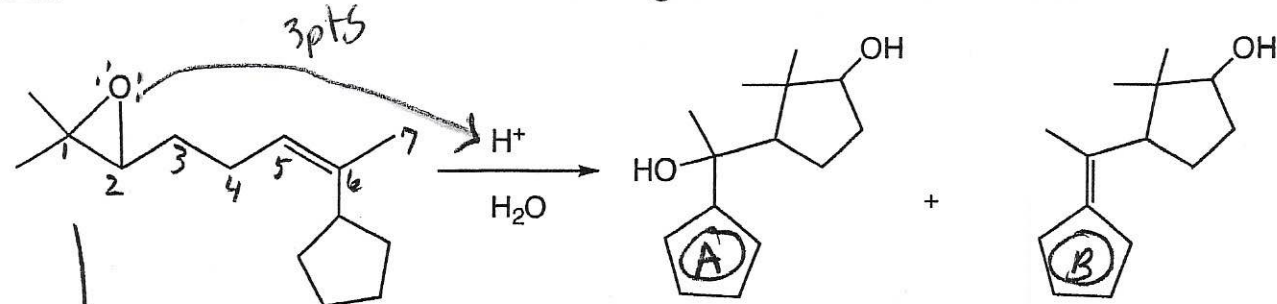


4



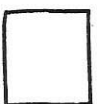
**D. Mechanisms: (12 points)**

The reaction below produces a mixture of products. Provide a clear mechanism to explain the formation of the products shown. Use curved arrows to indicate "electron flow". Remember to show only one step at a time. Show all intermediates and all formal charges. Do not show transition states.



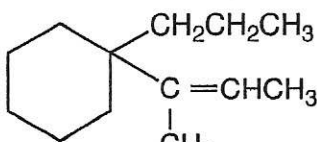
\* if epoxide NOT protonated so kick out  $-O^-$  (-3)

protonate epoxide — 3pts  
 $\pi$  attacks — 3pts  
 $H_2O$  attacks — 2pts  
 deprotonate O — 2pts  
 deprotonate C — 2pts



**E. Synthesis:** (12 points)

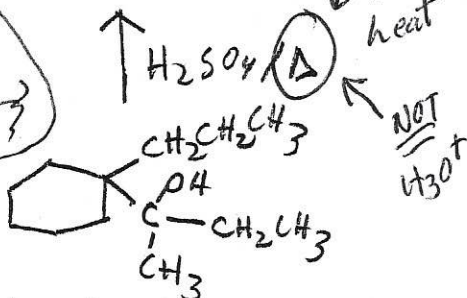
Synthesize the molecule below from cyclohexanol and alcohols of four carbons or less, any oxidizing or reducing agents, and any other inorganic reagents. (Please do not include mechanisms.)



\* No credit for synthesizing allowed SM

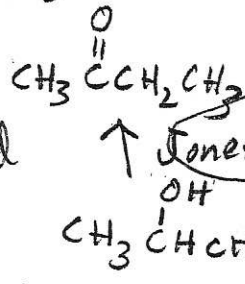
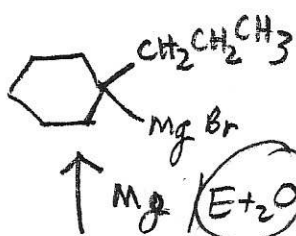
\* No extra credit for synthesizing something twice

RmgX in presence of acidic H (OH or H)  $\leftarrow$  C=C  $\leftarrow$  (-2)



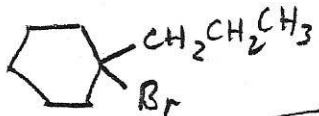
(-1) without

then  $\text{H}_3\text{O}^+$

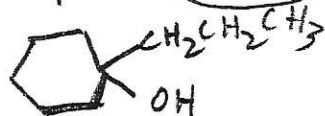


$\text{CrO}_3/\text{H}_2\text{SO}_4/\text{H}_2\text{O}/\text{acetone}$   
0°C

Jones' ox or  $\text{Na}_2\text{Cr}_2\text{O}_7/\text{H}_2\text{SO}_4/\text{H}_2\text{O}$  or PCC or NaOCl

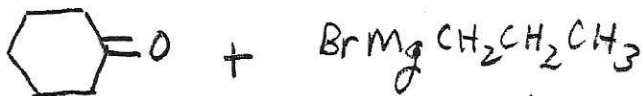


OK if omitted  
OK if omitted  
NOT  $\text{PBr}_3$  (-1)



\* if somehow use acetylide +  $-\text{C}=\text{O}$  correctly  $\rightarrow$  OKay

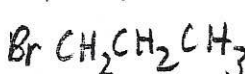
(-1) without then  $\text{H}_3\text{O}^+$



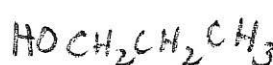
Jones' ox OR any of above



$\text{Mg}/\text{Et}_2\text{O}$



$\text{PBr}_3$



$\text{Br}_2/\text{light}$   $\text{CH}_3\text{CH}_2\text{CH}_3$   
(-1)  
Not allowed

(+2) SM not allowed

1)  $\text{X}_2/\text{light}$   
2) strong base  
3) 1)  $\text{NaCN}/\text{H}_2\text{O}$  or  $\text{H}_3\text{O}^+$  or hydroboration  
6

