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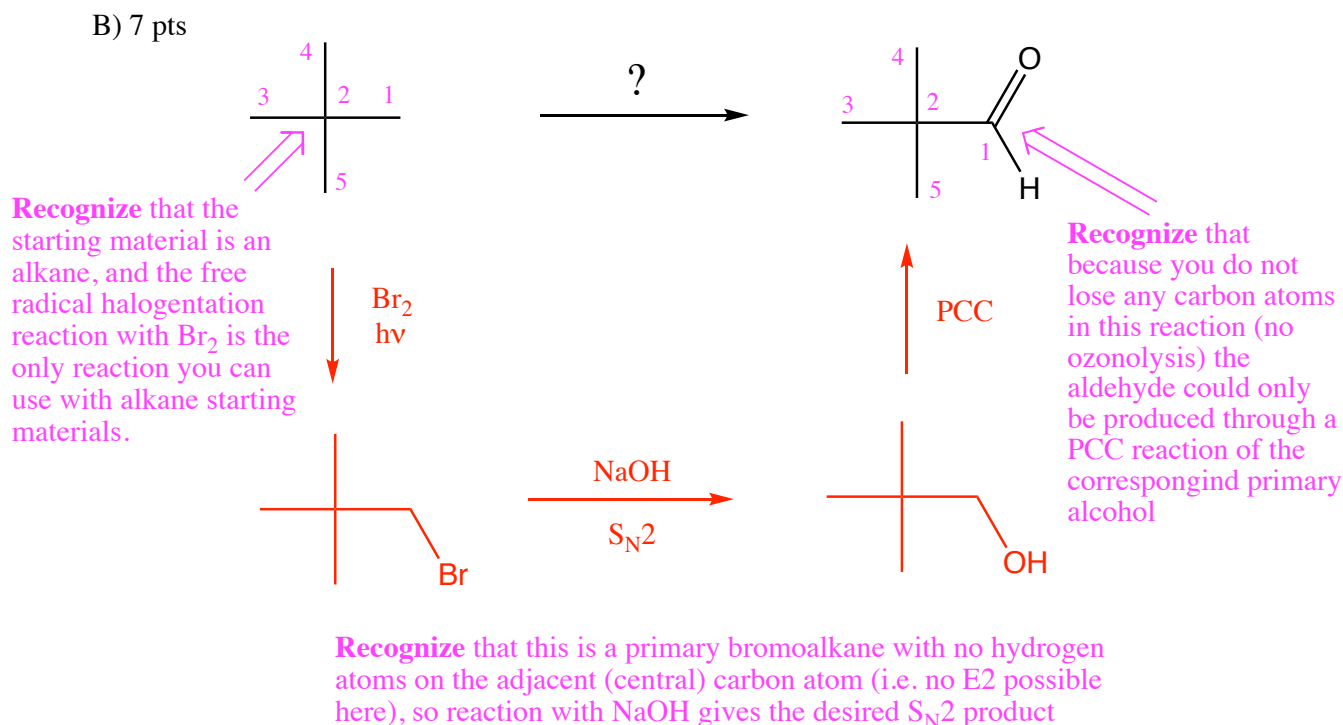
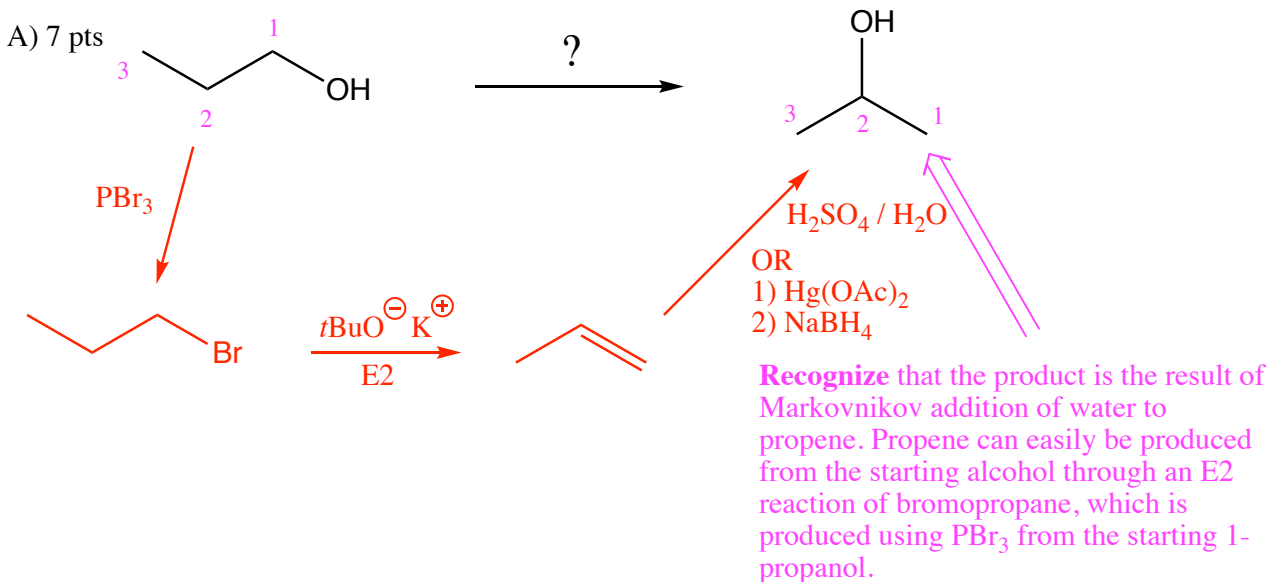
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Chemistry 320M/328M
Dr. Brent Iverson
10th Homework
November 12, 2025

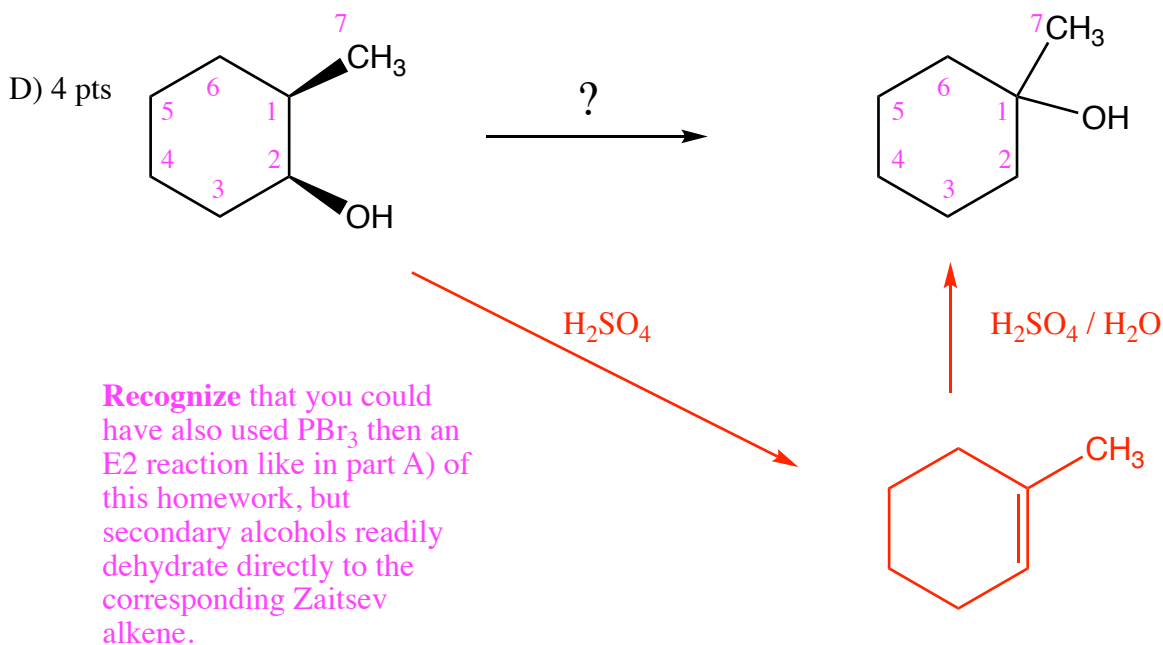
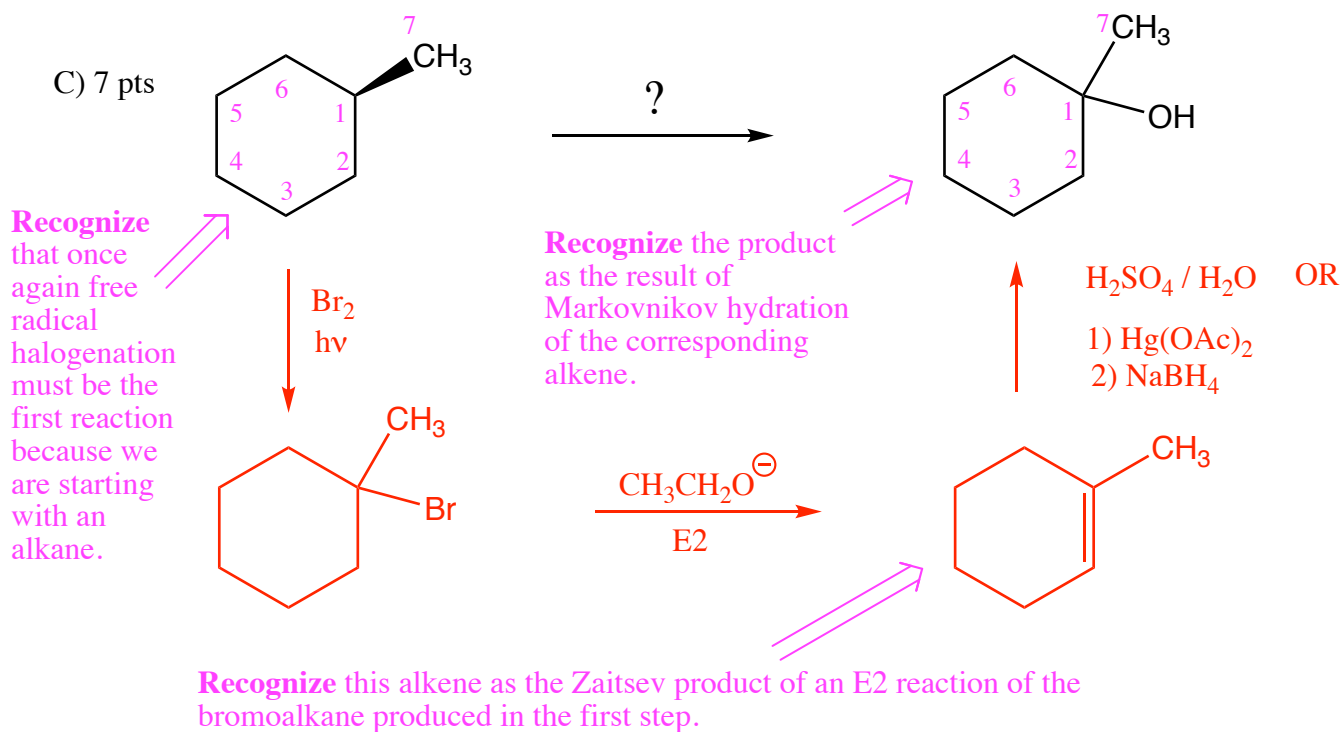
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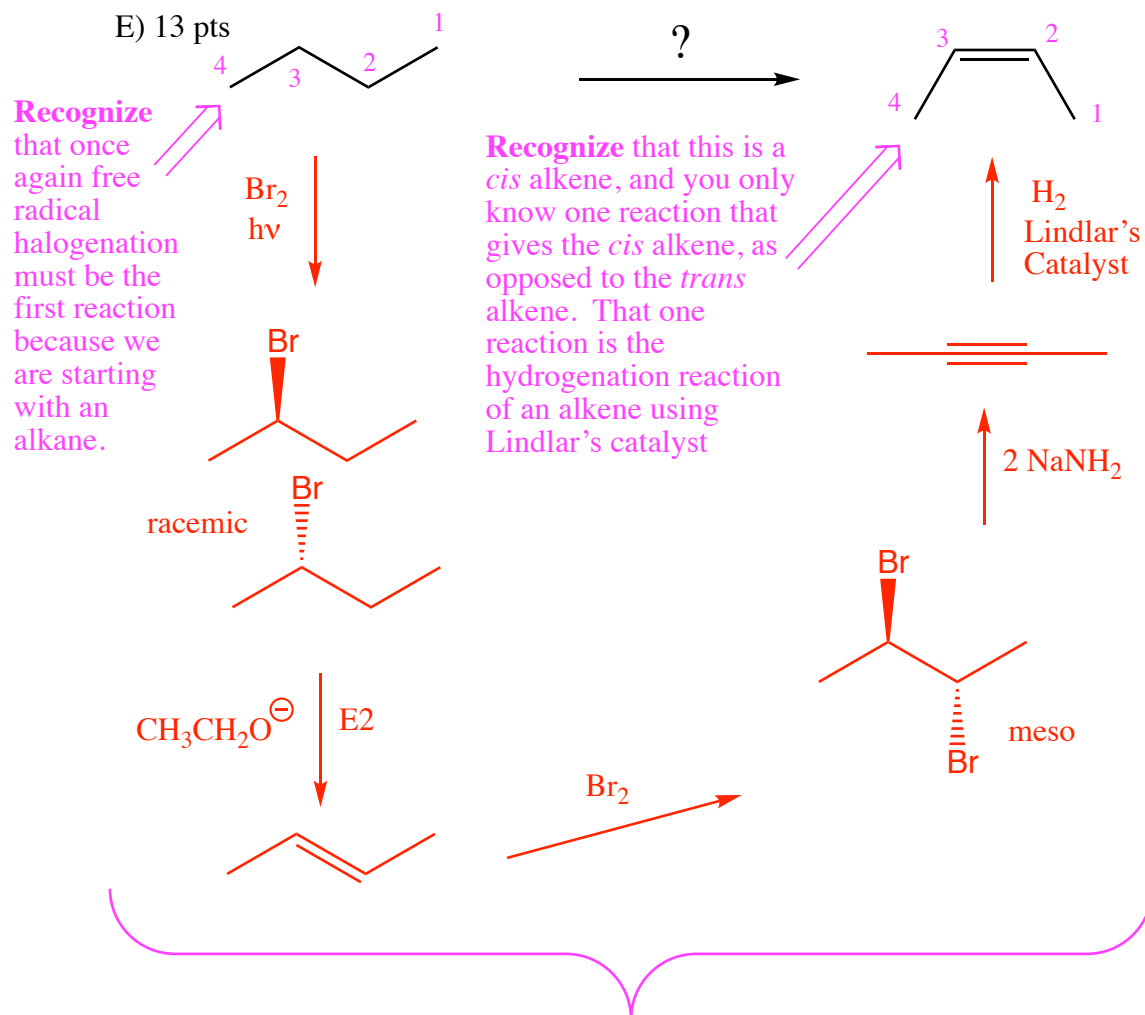
1. These are synthesis questions. You need to show how the starting material can be converted into the product(s) shown. You may use any reactions we have learned. Show all the reagents you need. Show each molecule synthesized along the way and be sure to pay attention to the regiochemistry and stereochemistry preferences for each reaction because only predominant products can be used. All the carbon atoms of the product(s) must come from the starting material(s) shown.



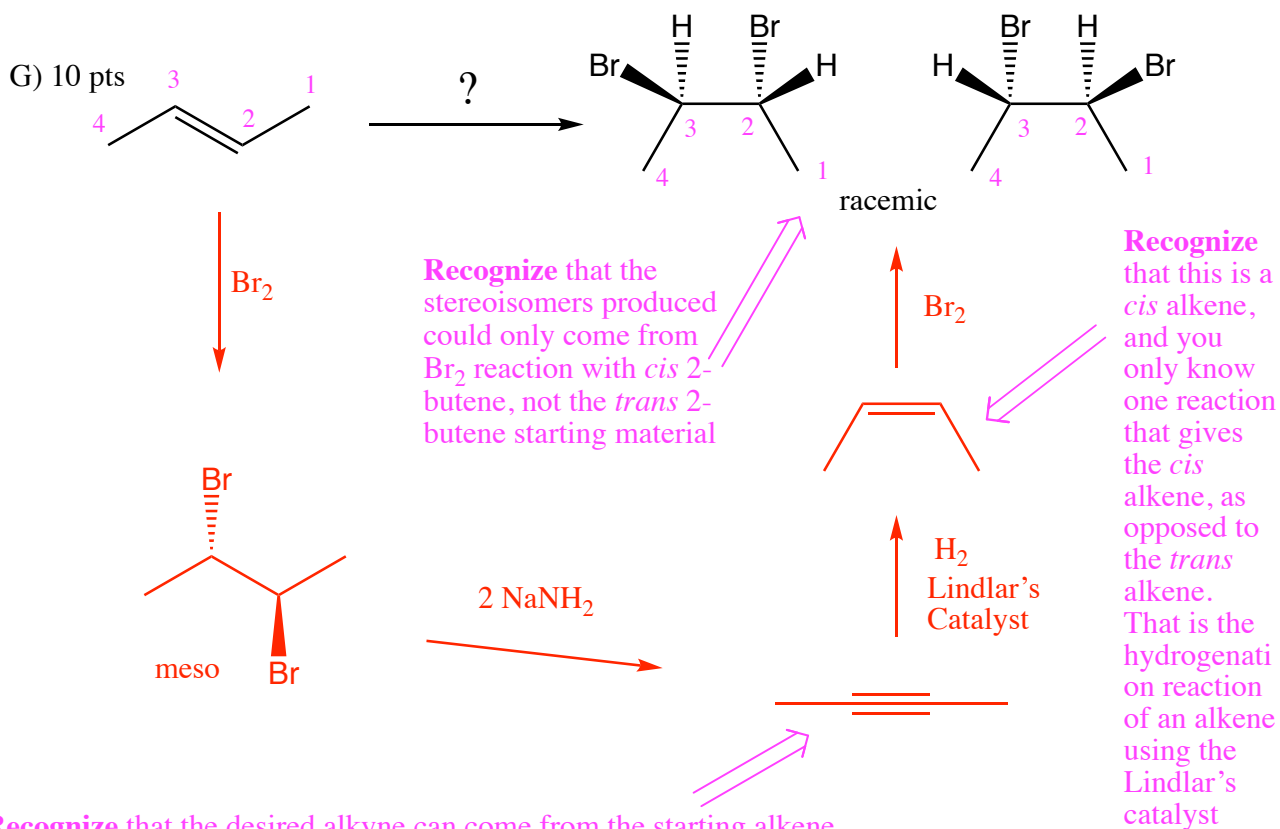
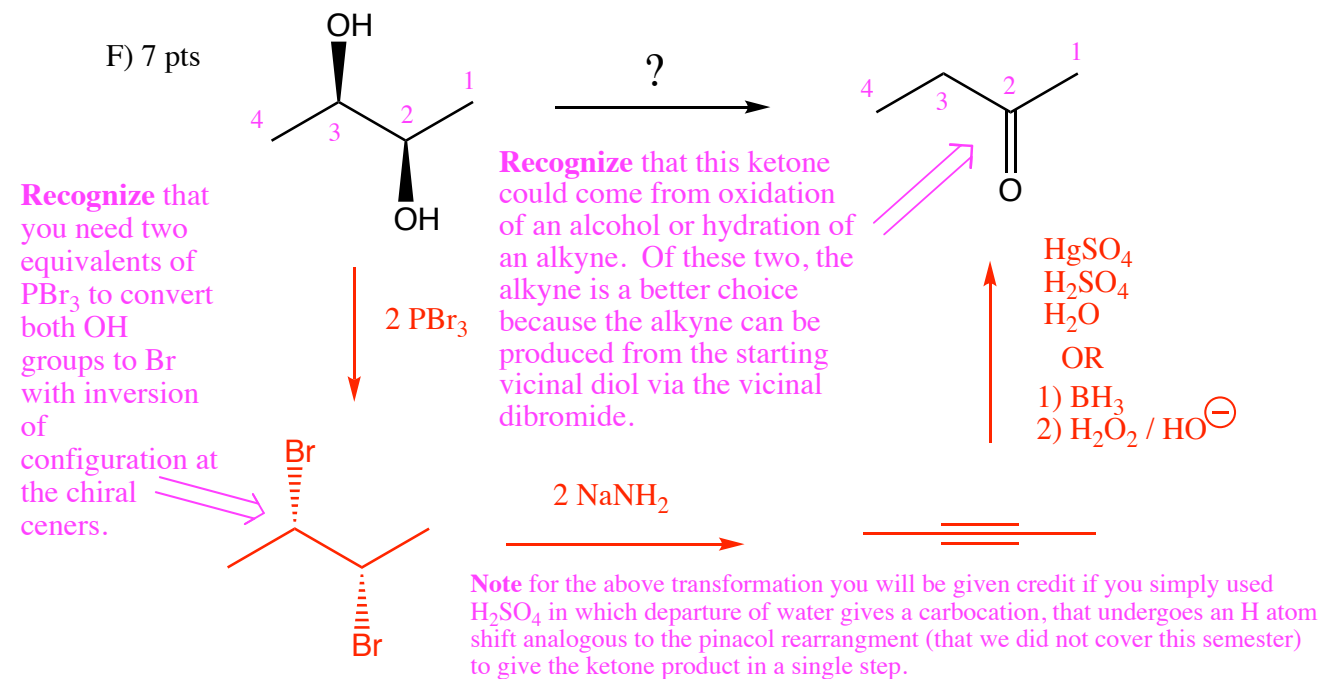
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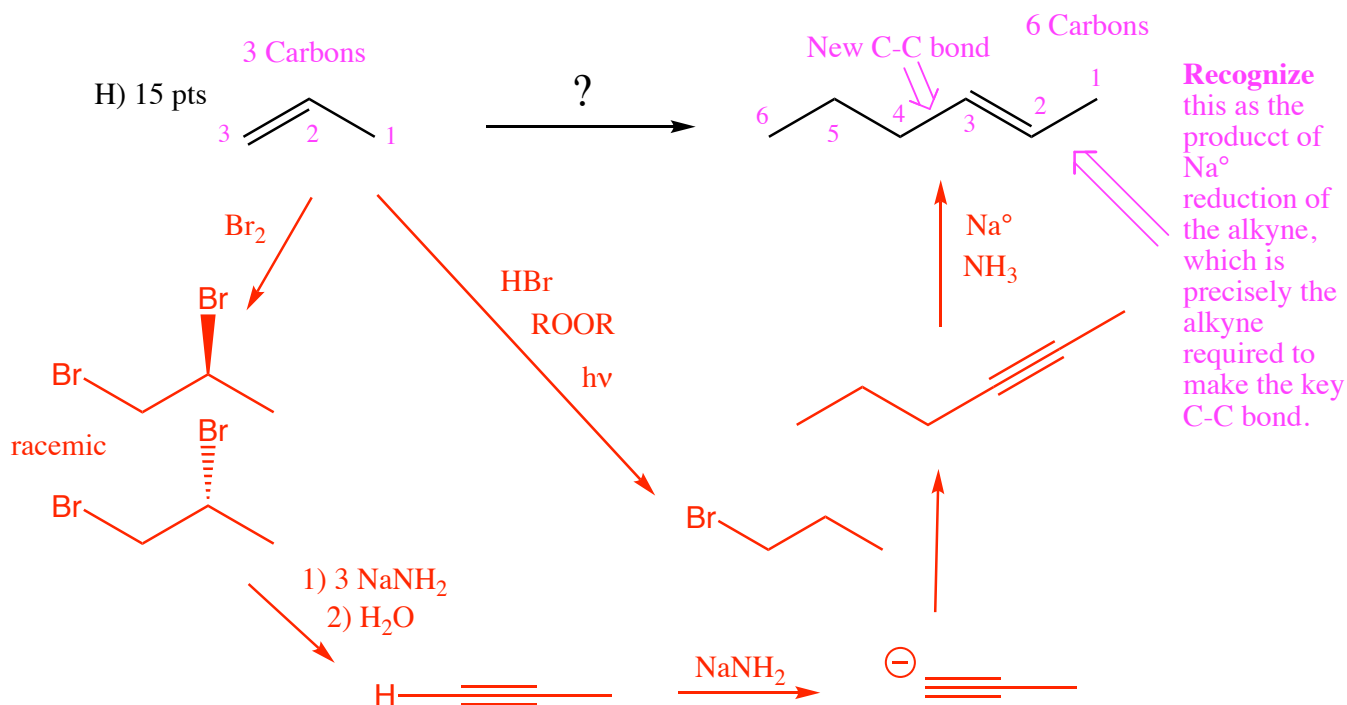


1. (cont.) All the carbon atoms of the product(s) must come from the starting material(s) shown.



Recognize that the desired alkyne can come from the starting alkene via the often used reaction sequence of halogenation of the alkene, followed by double elimination of the vicinal dihalide.

1. (cont.) All the carbon atoms of the product(s) must come from the starting material(s) shown.



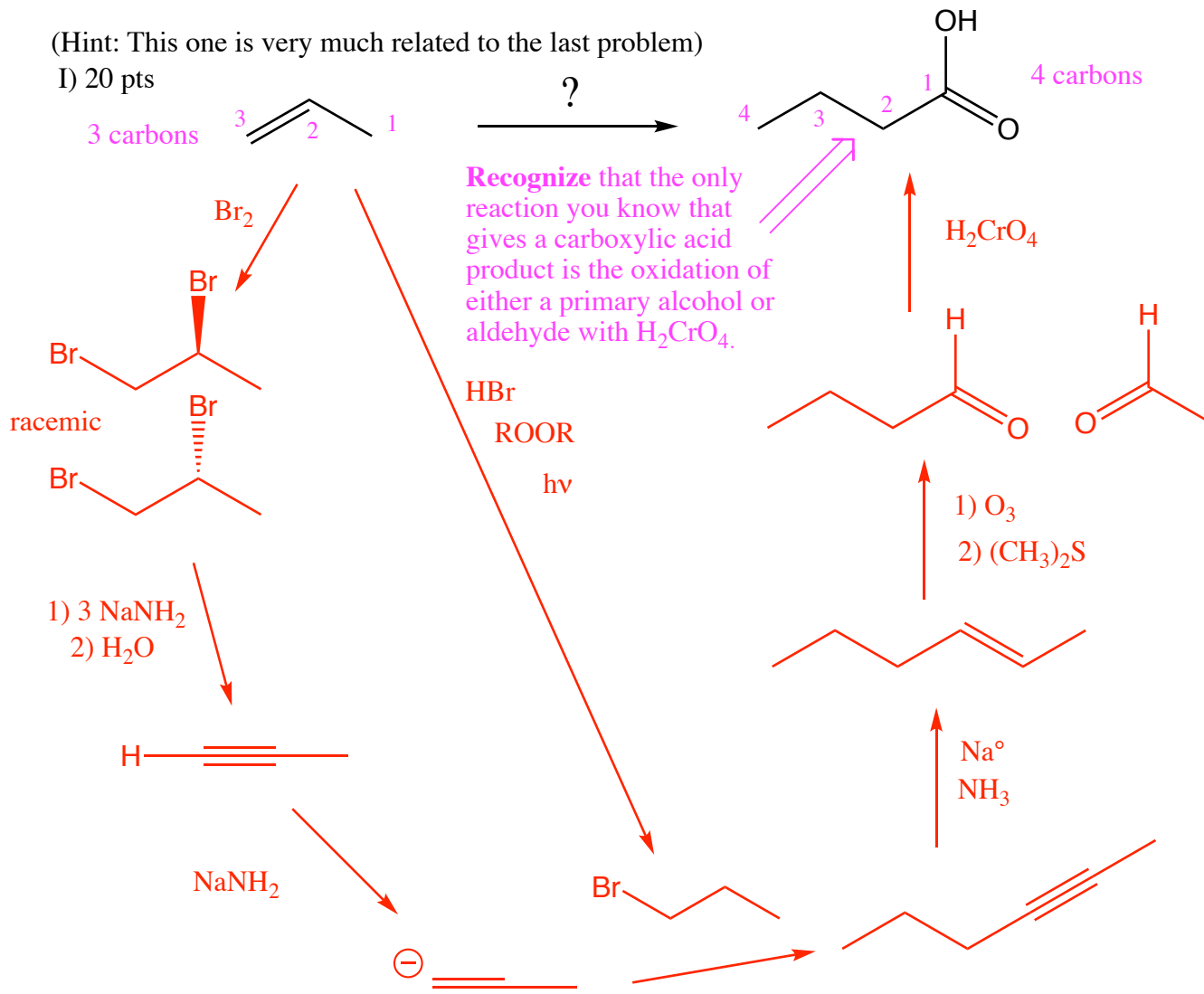
Recognize that the alkene product has 6 carbons, exactly twice the number of the starting material. That means two molecules derived from the starting material were reacted to make a new carbon-carbon bond. The only reaction you know that can generate a new carbon-carbon bond is the $\text{S}_{\text{N}}2$ reaction of a deprotonated terminal alkyne with a primary haloalkane. Thus, the problem comes down to conversion of the starting propene into an alkyne using halogenation and double elimination. Propene can be converted into 1-bromopropane in one step using the non-Markovnikov, free radical addition of H-Br in the presence peroxide (ROOR) and light.

Note Besides the reduction of an alkyne using Na° , the alkene product could have been the Zaitsev product derived from E2 elimination of an haloalkane or dehydration of an alcohol. We can rule out these latter two reactions in favor of the alkyne reduction reaction because we know that the alkyne must be involved since a C-C bond was made.

1. (cont.) All the carbon atoms of the product(s) must come from the starting material(s) shown.

(Hint: This one is very much related to the last problem)

I) 20 pts



Recognize that the key to this problem is counting carbons correctly. We have four carbons in the product, but only three in the starting material. From this you conclude that in this synthesis there must be a C-C bond forming reaction to give a molecule with 6 carbon atoms, followed by an ozonolysis to give a product with only 4 carbons. In addition, we gave the hint that the last problem's answer was related, so we hoped you would realize that an ozonolysis of the product from problem H) would give an aldehyde with the required 4 carbon atoms. Oxidation of the 4-carbon aldehyde product of ozonolysis gives the carboxylic acid product.