A. (1.0 pts.) Give the IUPAC name(structure) for each of the following.

1. cyclopentyllithium
2. CH₃CH₂MgI

B. (4.0 pts.) Give the most likely product for each of the following reactions.

1. \[
\begin{align*}
\text{O} & \quad \text{CH₃CH₂MgBr} & \text{ether} & \rightarrow & \text{H₂O} \\
\text{CH₃-CH₂CH₃} & \quad \text{HC≡C}^{-} \\
\end{align*}
\]
2. \[
\begin{align*}
\text{O} & \quad \text{CH₃-C-CH₂CH₃} + \text{HC≡C}^{-} & \text{ether} & \rightarrow & \text{H₂O} \\
\end{align*}
\]
3. (CH₃)₂CHLi + D₃O⁺ →
4. C₆H₅CH₂Cl + Mg/ether →

C. (5.0 pts.) Outline all steps in a possible laboratory synthesis of each of the following compounds from alcohols of four carbons of less and any needed inorganic reagents.

1. 1-pentanol
2. 2-methyl-3-hexanol
3. 3-methyl-1-pentanol
4. 1-hexene
5. [drawing of a compound]

Bonus (1.0 pts.) A researcher needed a labeled compound for an NMR spectrum. Propose a synthesis that could be used to prepare the compound CH₃CHDCH₂CH₃ from any butanol and any needed inorganic reagents.