Exam #1

This is an open-book, open-notes exam. You may take up to three hours. For each transformation shown, draw detailed arrow-pushing mechanisms for each step, including the explicit chemical structure of every reactant and reagent shown (show every heavy atom – H’s not required), all stereochemistry, and all the organic products of each reaction. The abbreviations are exactly as they appear in the publication.

Each problem is worth twenty points.

1. 

\[
\text{TBSO-CH(OH)COOMe} \xrightarrow{1. \text{DIBAL-H}} \text{TBSO-CH(OH)COOH}
\]

\[
\text{H} \xrightarrow{2. (COCl)_2, \text{DMSO, Et}_3\text{N}} \text{H}
\]

2. 

\[
\text{PMBO} \xrightarrow{1. \text{n-BuLi}} \text{PMBO-CH=CHCH=OPMB}
\]

\[
\text{H} \xrightarrow{2. \text{ethyl formate (0.5 equiv)}} \text{H}
\]

3. 

\[
\text{O} \xrightarrow{1. \text{OsO}_4, \text{NMO acetone / H}_2\text{O}} \text{O}
\]

\[
\text{MOMO} \xrightarrow{2. \text{NaIO}_4 \text{THF/H}_2\text{O}} \text{MOMO}
\]

4. 

\[
\text{Ar} \xrightarrow{\text{LiOH}} \text{Ar}
\]

\[
\text{O} \xrightarrow{\Delta} \text{O}
\]

5. 

\[
\text{HCO}_2\text{H} \xrightarrow{100 \degree \text{C}} \text{HCO}_2\text{H}
\]