Exam #1

This is an open-book, open-notes exam. You make 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. \[ \begin{array}{c}
\text{BnO} \\
\text{H.} \\
\text{HO} \\
\text{HO} \\
\text{HO} \\
\end{array} \] \[ \begin{array}{c}
\rightarrow \\
\text{\(\rho\)-anisaldehyde} \\
\text{dimethyl acetal} \\
\text{PPTS, DMF} \\
\end{array} \] \[ \begin{array}{c}
\text{BnO} \\
\text{H.} \\
\text{HO} \\
\text{HO} \\
\text{HO} \\
\text{PMP} \\
\end{array} \]

2. \[ \begin{array}{c}
\text{EtO}_2\text{C} - \text{NHBOc} \\
\text{OH} \\
\text{OH} \\
\end{array} \] \[ \begin{array}{c}
\rightarrow \\
\text{1. SOCl}_2 \text{ / Et}_3\text{N} \\
\text{2. NaN}_3 \text{, DMF} \\
\end{array} \] \[ \begin{array}{c}
\text{EtO}_2\text{C} - \text{NHBOc} \\
\text{N}_3 \\
\end{array} \]

3. \[ \begin{array}{c}
\text{OTIPS} \\
\end{array} \] \[ \begin{array}{c}
\rightarrow \\
\text{4% Grubb's} \\
\text{catalyst} \\
\end{array} \] \[ \begin{array}{c}
\text{OTIPS} \\
\end{array} \]

4. \[ \begin{array}{c}
\text{PMBO} \\
\text{OPMB} \\
\end{array} \] \[ \begin{array}{c}
\rightarrow \\
\text{PMe}_3 \\
\text{PMBO} \\
\text{H.} \\
\text{H.} \\
\end{array} \]

5. \[ \begin{array}{c}
\text{OTIPS} \\
\end{array} \] \[ \begin{array}{c}
\rightarrow \\
\text{Dibal-H} \text{ then SiO}_2 \\
\text{(treat as H+ / H}_2\text{O)} \\
\end{array} \]