Problem Set 7
Stereocontrolled Alkylation and Practice Problems for First Exam

These problems provide further practice in applying the chemistry discussed in Unit 3 and also include targets that require application of transformations studied in earlier units and in the September assignment on functional group chemistry. In each case, design a highly stereoselective synthesis of the target molecule beginning with commercially available materials. Be sure to explicitly identify all reagents necessary for each transformation. Enantiomerically enriched reagents may be used if they are commercially available; however, with the exception of the two compounds shown below, each stereogenic center in the target molecule must be generated in your synthetic route. In other words, the stereogenic carbons in the chiral reagents you employ cannot be directly incorporated in the final product. The exceptions are (S) and (R) methyl 3-hydroxy-2-methylpropionate, which are commercially available and have been widely employed in total synthesis.

\[
\text{HO-} \text{CO}_2\text{Me} \quad \text{HO-} \text{CO}_2\text{Me}
\]

(1) \[\text{Br-} \quad \text{O-} \quad \text{OMe}\]

(2) \[
\text{H-} \quad \text{N-} \quad \text{H-} \quad \text{N-}
\]

(3) \[
\text{H-} \quad \text{OBn}
\]
The next 7 problems are from past year's 5.512 exams. Save these for last! However, note that those exams did not cover all of the same chemistry that will be included on this year's 5.511 exam.