1. (10 points) Outline a synthetic route to A. You may start with any monosubstituted benzene derivative that contributes seven or fewer carbons to the final product, and/or any acyclic piece(s) that contribute(s) three or fewer carbons to the final product. You may assume that o,p-reactions will give the para product if that site is open.

\[\text{A} \]

2. (10 points) Deduce the structure of C, and draw an arrow-pushing mechanism for its formation.

\[\text{B} \xrightarrow{\text{NaH}} \text{C} \]

\[\text{C} \text{H}_{24}N_{2}O_{2} \]

\[\begin{align*}
\text{13C NMR} & \\
& 12.0, \text{q (2)} \\
& 13.2, \text{q} \\
& 20.1, \text{t} \\
& 32.5, \text{t} \\
& 33.1, \text{t} \\
& 41.0, \text{t} \\
& 48.9, \text{t} \ (2) \\
& 49.5, \text{t} \\
& 170.5, \text{s} \\
\end{align*} \]

\[\begin{align*}
\text{1H NMR} & \\
& 0.96, \text{t, J = 7.1 Hz, 3H} \\
& 1.22, \text{t, J = 6.8 Hz, 6H} \\
& 1.4, \text{m, 4H} \\
& 2.30, \text{t, J = 7.8 Hz, 2H} \\
& 2.55, \text{t, J = 7.2 Hz, 2H} \\
& 2.83, \text{t, J = 7.8 Hz, 2H} \\
& 3.24, \text{q, J = 6.8 Hz, 4H} \\
& 6.3, \text{bs, 1H (exchanges)} \\
\end{align*} \]

3. (10 points) Draw an arrow-pushing mechanism for the conversion of D to E.