"My relationship to power and authority is that I'm all for it. People need somebody to watch over them. Ninety-five percent of the people in the world need to be told what to do and how to behave."

–Arnold Schwarzenegger in a 1990 interview with U.S. News
1. Look at each of the following reactions. Give the type of reaction class to which indicated steps belong (S_N1, S_N2, E1, E2) in the space provided. (2 pts each) Then, give the major product or products for the following reactions. Be aware of details like rearrangements, Z&E, cis and trans, stereochemistry, regiochemistry, etc. (5 pts each)

a. 1-cyclobutyl-1-cyclohexanol

\[ \text{1)} \text{TsCl, py} \]
\[ \text{2)} \text{KOEt, EtOH} \]

STEP 2: ___E2____

b. 3-methyl-2-heptene

\[ \text{1)} \text{Cl}_2, \text{H}_2\text{O} \]
\[ \text{2)} \text{NaCN, DMSO} \]

STEP 2: ___S_N2____

c. (2R)-3-ethyl-2-pentanol

\[ \text{1)} \text{Br}_2, \text{light} \]
\[ \text{2)} \text{CH}_3\text{OH, heat} \]

STEP 2: ___S_N1 & E1____

d. \[ \text{1)} \text{NaOMe} \]
\[ \text{2)} \text{mCPBA, CH}_2\text{Cl}_2 \]

STEP 1: ___E2____
2. What would the starting material or reagents be to carry out the following transformations? Be sure to include all pertinent details! (5 pts each)

a. 

\[
\text{CH}_3\text{CN} \xrightarrow{\text{NaOCH}_2\text{CH}_3, \text{CH}_3\text{CN}} \text{CH}_3\text{OCH}_2\text{CH}_3
\]

b. 

\[
\text{PhCH}_2\text{Cl} \xrightarrow{\text{KOH, } S_N2 \text{ solvent}} \text{PhCH}_2\text{OH}
\]

c. 

\[
\text{LiN[CH(CH}_3)_2], \text{HN[CH(CH}_3)_2] \xrightarrow{\text{L.G.}} \text{product}
\]

3. Given the following road map, give structures for A, B, and C shown. (4 pts each)

\[
\text{1) BH}_3\text{-THF} \quad \text{2) H}_2\text{O}_2, \text{KOH} \quad \text{A (C}_8\text{H}_{10}\text{O)} \quad 1) \text{Na}^+, \text{DMF} \quad \text{C (C}_{12}\text{H}_{17}\text{O}_3\text{Br)} \quad 1) \text{TsCl (2 eq), py} \quad \text{C (PhO)}
\]

\[
\text{1) Br}_2 (2 \text{ eq), H}_2\text{O} \quad \text{B (C}_4\text{H}_8\text{O}_2\text{Br}_2)}
\]

A = \[
\text{Benzylic alcohol}
\]

B = \[
\text{Dibromo compound}
\]

C = \[
\text{Brominated alcohol}
\]
4. For two of the next three, draw step-by-step mechanisms to account for the products shown. There may be other products formed, but you do not need to account for them in your mechanisms. Be sure to draw arrows to account for the flow of electrons and show all steps.

i. 

ii. 1/3 eq. PBr₃
(20) 5. Synthesize two out of the three following targets. You may use monofunctional compounds of four carbons or less, bases for elimination or deprotonation, any inorganic reagent, and any solvent you need. Be sure to use good chemical steps that produce high yields for maximum points. Do not leave this question blank! (10 pts each)

Any reasonable synthesis accepted. Please come talk to me if you have questions.

(3) BONUS: Name an actor (male or female) besides Arnold Schwarzenegger who is/was a politician (1 pt). Name the public office they hold/held (2 pts).

All reasonable answers accepted, even Jerry Springer and Jesse Ventura who are not really actors...