"I don't do yoga. I bite the hella outta my nails. I smoke, I eat all the wrong food, I don't exercise."
Lisa Marie Presley
What are the products of the following reaction sequences. Think logically and write out intermediates if you need to. Be aware of details like stereochemistry, regiochemistry, selectivity, etc. (5 pts each)

a. 
\[
\begin{align*}
\text{Br} & \xrightarrow{1) \text{PPh}_3, \text{THF}} \\
\text{EtO} & \xrightarrow{2) \text{nBuLi, THF}} \\
\text{EtO} & \xrightarrow{3) \text{acetophenone}}
\end{align*}
\]

b. 
\[
\begin{align*}
\text{EtO} & \xrightarrow{1) \text{PhCH}_2\text{MgCl, Et}_2\text{O}} \\
\text{EtO} & \xrightarrow{2) \text{H}_3\text{O}^+} \\
\text{EtO} & \xrightarrow{3) \text{Na}_2\text{Cr}_2\text{O}_7, \text{H}_2\text{SO}_4}
\end{align*}
\]

c. 
\[
\begin{align*}
\text{MeO} & \xrightarrow{1) \text{KOMe, MeOH}} \\
\text{MeO} & \xrightarrow{2) \text{H}_3\text{O}^+}
\end{align*}
\]

d. 
\[
\begin{align*}
\text{MVK, KOH} & \xrightarrow{\text{water, heat}} \\
1) & \xrightarrow{1) \text{NaH, DMF, 0°C}} \\
2) & \xrightarrow{2) \text{Et-I, DMF}} \\
3) & \xrightarrow{3) \text{MeMgBr, Et}_2\text{O}} \\
4) & \xrightarrow{4) \text{H}_3\text{O}^+}
\end{align*}
\]

e. 4-pentanone
(30) 2. What is the mechanism of two out of the following three transformations? Please choose only two and clearly indicate which ones you would like graded. Show all arrows, resonance structures, formal charges, etc. for full credit. (15 pts each)

a. 

b. 

c. 
3. Given the following targets, choose two and synthesize them utilizing legal starting materials. Legal starting materials include: 1,3-dithiane; benzene; monofunctional compounds of 4 carbons or less; bases for deprotonation; and any inorganic reagent (-CN, PPh₃, PDC, PCC, etc. are all inorganic) or solvent needed to carry out the transformation. Use good steps that give the desired product as the major product. (13 pts each)
(12) 4. Given the following roadmap, give structures to account for A, B, and C. (4 pts each)

\[
\begin{align*}
\text{A} &= \text{nBuLi, hexanes} \\
&\quad \xrightarrow{1) \text{nBuLi, hexanes}} \text{C}_{10}\text{H}_{12}\text{O} \\
\text{B} &= \text{LDA, THF, -78°C} \\
&\quad \xrightarrow{1) \text{LDA, THF, -78°C}} \text{C}_{11}\text{H}_{12}\text{O} \\
\text{C} &= \text{PhCH}_2\text{CH}_2\text{I} \\
&\quad \xrightarrow{2) \text{PhCH}_2\text{CH}_2\text{I}} \text{Hg}^{2+}, \text{H}_2\text{O} \\
&\quad \xrightarrow{3) \text{Hg}^{2+}, \text{H}_2\text{O}} \text{PhCH}_2\text{CH}_2\text{I} \\
&\quad \xrightarrow{1) \text{LDA, THF, -78°C}} \text{C}_{11}\text{H}_{12}\text{O} \\
&\quad \xrightarrow{2) \text{Me-Br}} \text{PhCH}_2\text{CH}_2\text{I} \\
&\quad \xrightarrow{3) \text{Me-Br}} \text{PhCH}_2\text{CH}_2\text{I} \\
\end{align*}
\]

5. We have not talked about protecting alcohols in class, per se, but we have talked about this reaction! Really! Give the product and a step-by-step mechanism to account for the formation of the product.

\[
\begin{align*}
&\text{H}^+ + \text{OH}^- + \text{HOTs} \\
&\xrightarrow{\text{H}^+ + \text{OH}^- + \text{HOTs}} \text{Product} \\
\end{align*}
\]

(3) Extra Credit: Which in class treat on April 10th did you like best?