"It's a dog-eat-dog world and I'm wearing Milk Bone underwear." - Norm from Cheers

"I cannot be bought, and I cannot be threatened. But if you put them both together then I'm your man!" - Norm from Cheers replying to his boss's unsavory request to have someone fired.
1. Give the major organic product/products for following reactions. Be mindful of specifics such as rearrangements. Indicate major and minor products where appropriate. If one or more chiral centers are present in your product, then explicitly show all stereoisomers produced using wedges and dashes (4 pts. each).

a. 1-ethylcycloheptene
   \[ \text{1) BH}_3\text{-THF} \] \[ \text{2) H}_2\text{O}_2, \text{KOH} \]

b. E-2,2,5-trimethylhex-3-ene
   \[ \text{CH}_2\text{I}_2, \text{Zn (Cu)} \]

c. 3-chloro-2,2,5-trimethylhexane
   \[ \text{1) NaOMe, MeOH} \] \[ \text{2) H}_2, \text{Pt/C} \]

d. E-5-ethylhept-3-ene
   \[ \text{HI} \]

e. Excess \text{Br}_2
   \[ \text{CCl}_4 \]
2. Consider the following reaction:

a. Draw out the product of this reaction and denote any chiral centers by using asterisks (3 pts).

![Product with chiral center](image1)

b. Draw all possible stereoisomers (using the wedge and dash convention) of this product (4 pts).

![Possible stereoisomers](image2)

c. Label each of your drawings as A, B, C, etc. and draw the corresponding Fisher projection for each stereoisomer (2 pts).

![Fisher projections](image3)

d. Label each chiral center in your drawing above as R or S using the Cahn-Ingold-Prelog rules (4 pts).

3. Complete the following synthetic problems (There may be more than one step to complete the transformation). Keep in mind things like stereochemistry where appropriate.
a) Starting with Compound A, devise a synthesis to produce compounds B. (8 pts)

A → B

1. Add Br2 + hv
2. Add KOEt
3. Add H2O2, KOH

A → B

1. BH3-THF
2. EtOH

A → B
b) Starting with Compound A, devise a synthesis to produce compound B + C. (8 pts)

\[
\begin{align*}
&\text{A} \quad \overset{\text{H}_2\text{SO}_4, \text{heat}}{\rightarrow} \quad \overset{1) \text{O}_3 \quad 2) \text{CH}_3\text{SCH}_3}{\longrightarrow} \quad \text{B} + \text{C} \\
\end{align*}
\]

c) What monomer would need to be used to produce the following polymer? (4 pts)

\[
\begin{align*}
&\overset{\text{HO} \quad \text{OH} \quad \text{OH} \quad \text{HO} \quad \text{OH}}{\text{F \quad F \quad F \quad F \quad F}} \\
&\text{n} \\
\downarrow \\
&\text{HO} \quad \text{F} \\
\end{align*}
\]
4. Provide a detailed arrow pushing mechanism for the following 3 reactions (9 pts. each)

a) 
\[
\text{HBr} \quad \rightarrow \quad \text{Br} \quad + \quad \text{Br} \quad + \quad \text{Br}
\]

see me with questions

b) 
\[
\text{HBr \ peroxides} \quad \rightarrow \quad \text{Br} \quad + \quad \text{Br}
\]

see me with questions

c) 
\[
\text{Cl}_2 \quad \rightarrow \quad \text{Cl} \quad \text{Cl}
\]

see me with questions
5. Predict the products (A-E) of the following reactions of norbornylene (4 pts each).

- **A** = \( \text{C}_7\text{H}_{10} \) + \( \text{O}_3 \) + m-CPBA
- **B** = \( \text{C}_7\text{H}_{10} \) + CHCl\(_3\) + KOH
- **C** = \( \text{C}_7\text{H}_{10} \) + \( \text{O}_3 \) + \( \text{Br}_2 \) + H\(_2\)O
- **D** = \( \text{C}_7\text{H}_{10} \) + H\(_2\)SO\(_4\)
- **E** = \( \text{C}_7\text{H}_{10} \) + heat

**A** = \( \text{C}_7\text{H}_{10} \) + \( \text{O}_3 \) + m-CPBA

**B** = \( \text{C}_7\text{H}_{10} \) + CHCl\(_3\) + KOH

**C** = \( \text{C}_7\text{H}_{10} \) + \( \text{O}_3 \) + \( \text{Br}_2 \) + H\(_2\)O

**D** = \( \text{C}_7\text{H}_{10} \) + H\(_2\)SO\(_4\)

**E** = \( \text{C}_7\text{H}_{10} \) + heat
(4) Extra Credit (80’s TV trivia):

(1) What is the name of the Dukes of Hazzard’s car?  General Lee

(2) What actor was famous for the line "nanoo nanoo"?  Robin Williams

(3) What product was Michael Jackson advertising for when he was nearly killed?  Pepsi

(4) What was the name of the principal on Saved by the Bell?  Dennis Belding