A finished person is a boring person.  -Anna Quindlen, Sesquicentennial Speaker

“In that era of general good will and expanding affluence, few Americans doubted the essential goodness of their society.” -David Halberstam, Sesquicentennial Speaker
1. On the following pig, draw actual structural examples (no R-) of four of the following five functional groups (line angle is fine): carboxylic acid; amide; ketone; aromatic; and ester. (3 pts each)

I've given examples, your compounds may not look like mine.

(32 pts) 2. Draw the structures for the starting materials for each of the following reactions. (3 pts each). Give actual product(s) for each of the following reactions. (5 pts each)

a. trans-4-s-butyl-1-cyclononene → H-I →

b. 3Z-5-isopropyl-3-methyl-3-octene → H-Br →

c. 1-ethyl-3,4-dimethyl-cyclopentene → H₃O⁺ →

d. 2,5-dibromo-3-hexyne → H-Cl (2 eq) →
(20 pts) 3. For problem 2 b, draw a structural isomer of the product you have drawn. (5 pts). Draw all the staggered Newman projections, sighting down the C3-C4 bond of the structural isomer you have drawn. (15 pts).

There were many different answers. I have drawn one example…

(12 pts) 4. Give a detailed, step-by-step mechanism for problem 2 c OR 2 d. Show all appropriate intermediates, resonance structures, and arrows for movement of all electrons.

2 c:

2 d:
(24 pts) 5. Identify the relationship between 6 of the 7 of the following pairs of compounds. Choose and clearly indicate your choice of only six or the first six will be graded. You may choose from: same thing; different compound; resonance structures; constitutional/structural isomers; and geometric isomers. (4 pts each)

a. \[ \text{and} \quad \text{STRUCTURAL/CONSTITUTIONAL} \]

b. \[ \text{and} \quad \text{STRUCTURAL/CONSTITUTIONAL} \]

c. \[ \quad \text{and} \quad 1,1\text{-dichloro-3-cyclopentyl-cyclohexane} \quad \text{DIFFERENT COMPOUND} \]

d. \[ \quad \text{and} \quad 4\text{-E-3-ethyl-4,5-diethyl-4-octene} \quad \text{SAME THING} \]

e. \[ 4\text{-t-butyl-5,6-dimethyl-1-heptyne} \quad \text{and} \quad \text{STRUCTURAL/CONSTITUTIONAL} \]

f. \[ \quad \text{and} \quad \text{RESONANCE STRUCTURES} \]

g. \[ 5\text{-iodo-4-isobutyl-cyclononyne} \quad \text{and} \quad \text{DIFFERENT COMPOUND} \]

(3 pts) **Extra Credit.** Give the correct IUPAC name for any one product from either 2 a or 2 b. 1-s-butyl-3-iodo-cyclononane, 1-s-butyl-4-iodo-cyclononane, 3-bromo-5-isopropyl-3-methylcyclohexane