Even people who write self-help books can get writer’s block.

“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)

![Diagram of a pig with structural formulas]

(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 → H$_3$O$^+$

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).

(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.
(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. \( \text{CH}_3\text{CH}_2\text{C}(\text{NH}_2)\text{CH}_3 \) and \( \text{CH}_3\text{CH}_2\text{C}(\text{NH}_2)\text{CH}_3 \)

b. \( \text{H}_3\text{C} \) and \( \text{H}_3\text{C} \)

c. \( \text{H}_3\text{C} \) and \( \text{H}_3\text{C} \)

d. \( \text{H}_3\text{C} \) and \( \text{H}_3\text{C} \)

e. \( \text{H}_3\text{C} \) and \( \text{H}_3\text{C} \)

(3 pts) Extra Credit. Give the correct IUPAC name for any one product from either 2 a or 2 b.