

Student ID _____

Name _____

page points:

2 _____ (20)

3 _____ (28)

4 _____ (16)

5 _____ (21)

6 _____ (15)

Total _____ (100)

Periodic Table

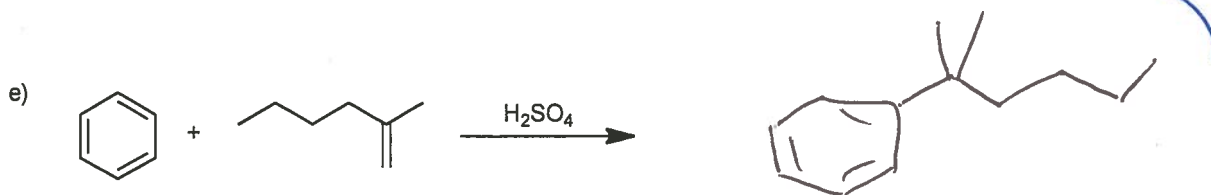
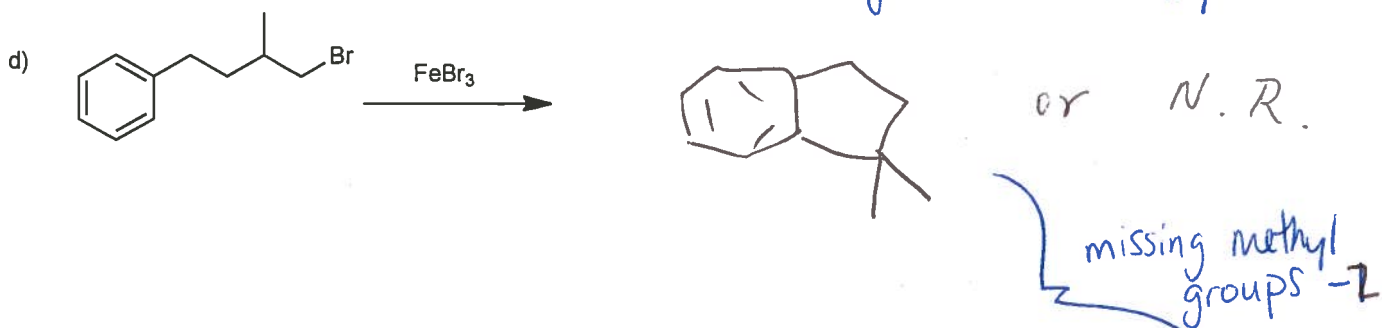
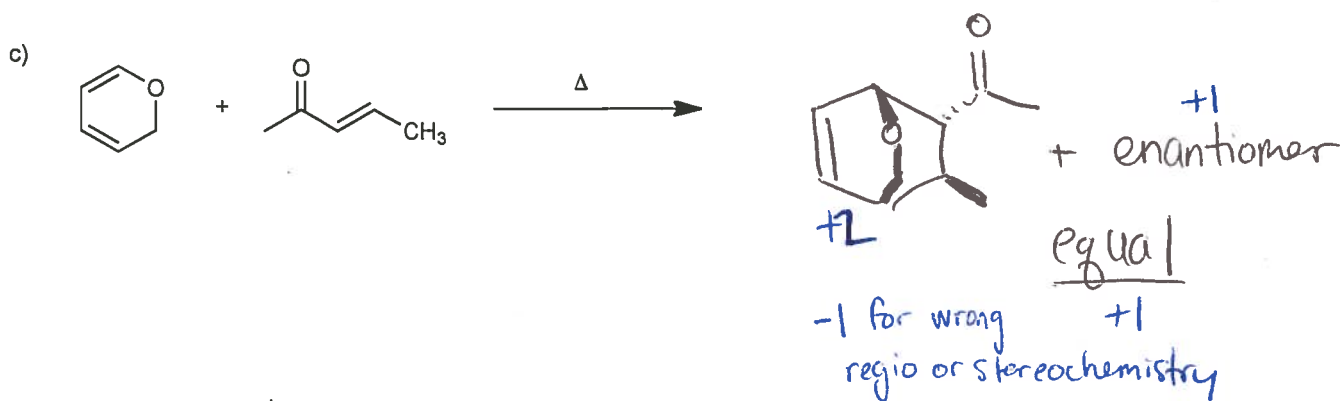
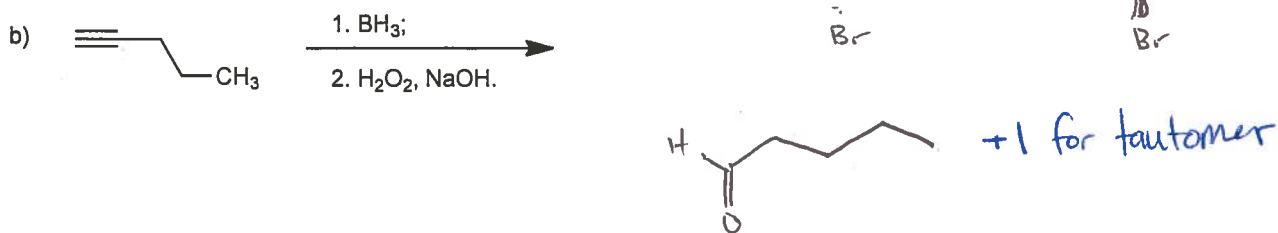
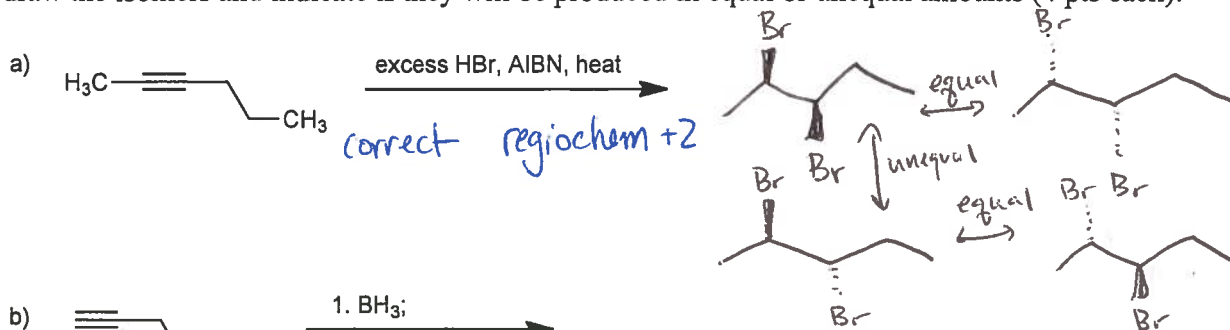
H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La	Ha	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac															

Please sit with an empty seat between you and your neighbors.

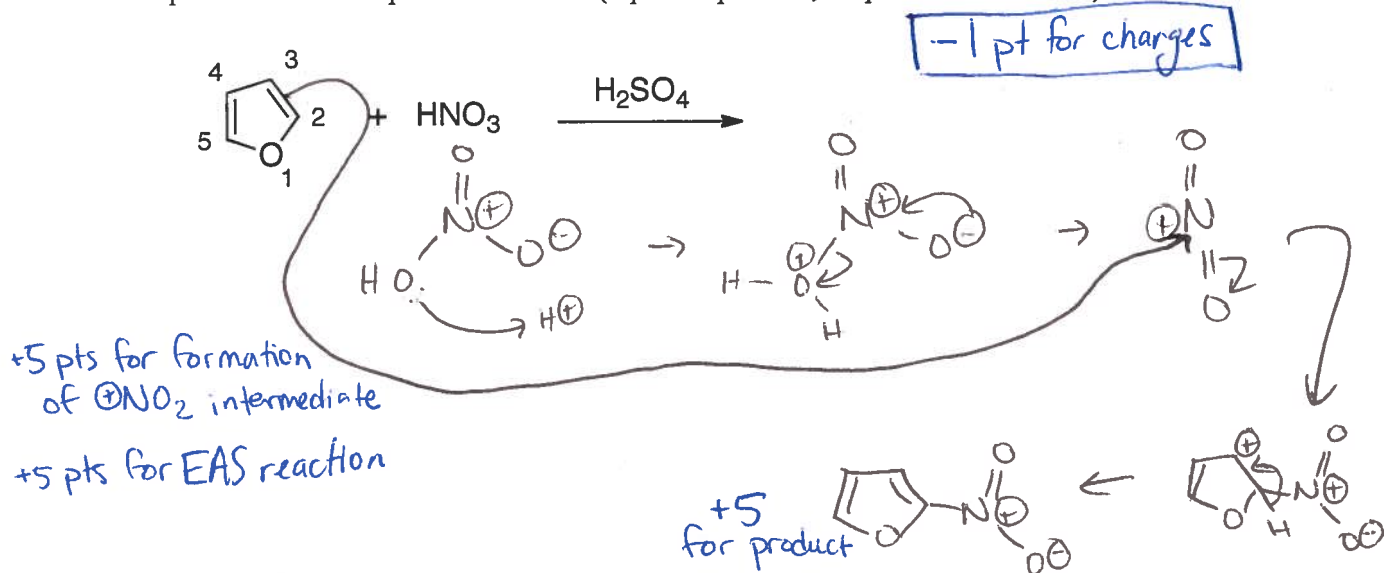
Unless specifically asked, you do not have to draw mechanisms for reactions.

Feel free to ask questions about the questions, but please don't ask questions about your answers, it distracts your neighbors.

1 Provide the products of the following reactions. If a reaction would produce stereoisomers, draw the isomers and indicate if they will be produced in equal or unequal amounts (4 pts each).



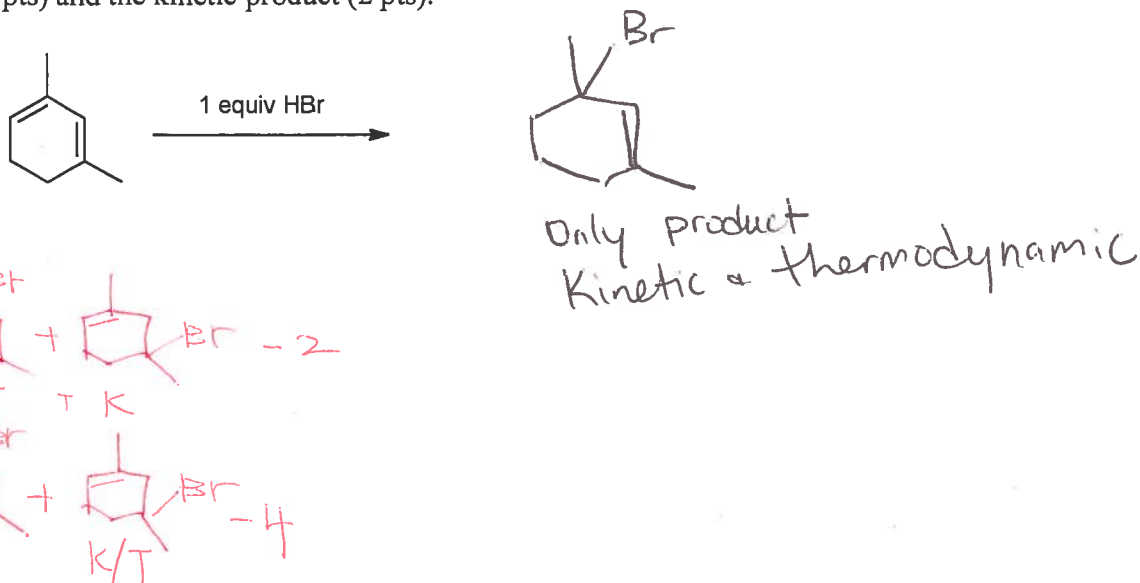
2a) Compared with benzene, furan is a more reactive aromatic molecule. The 2-position of furan is the most nucleophilic carbon among all carbons. Provide the products and mechanisms for the following reactions. Show every intermediate with the proper charges and all the arrows required for each step of the reaction (5 pts for product, 10 pts for mechanism).



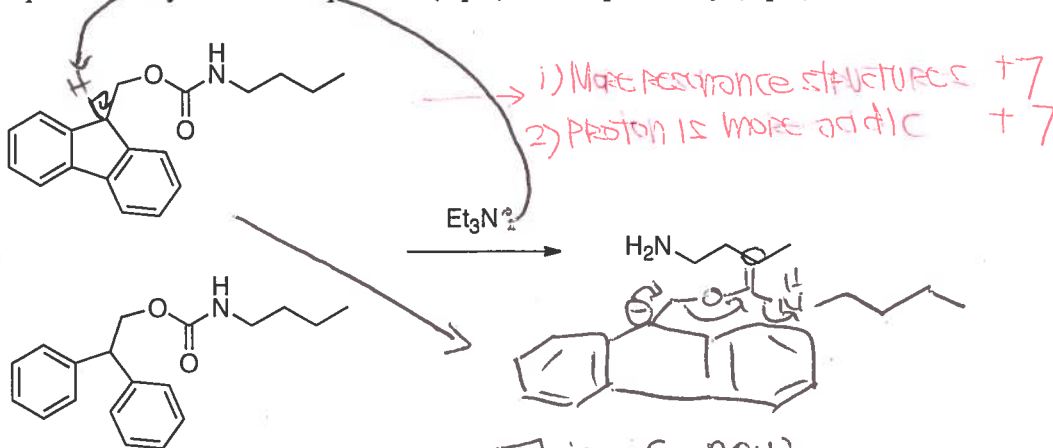
2b) Draw the most stable resonance structure of the non-aromatic intermediate of the above reaction (5 pts).



3. Draw the product(s) of the following reaction (4 pts) and label the thermodynamic product (2 pts) and the kinetic product (2 pts).



4a) Choose one of the following two substrates, which can react with triethylamine (a weak base) to provide butylamine as a product (4 pts), and explain why (6 pts).

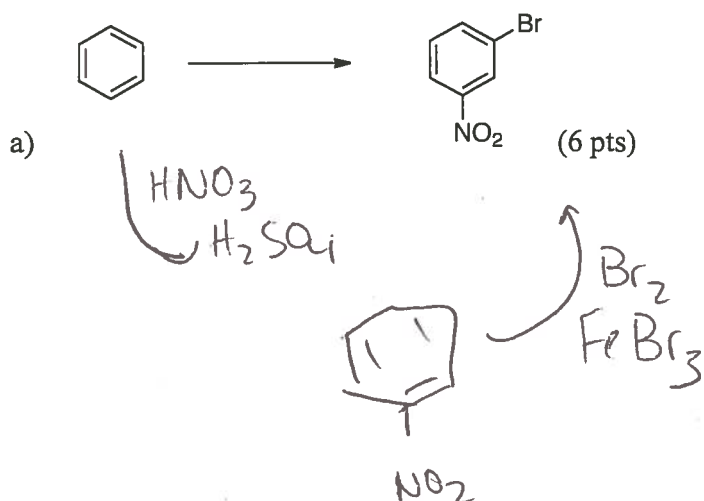


No partial credit
if this answer was
chosen

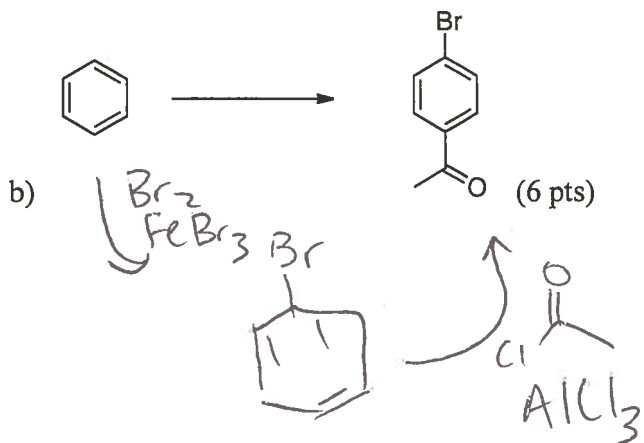
This is now aromatic. Therefore deprotonation is easy with a lower pKa due to gaining aromaticity.

eliminates, decarboxylates and expels butylamine as a product.

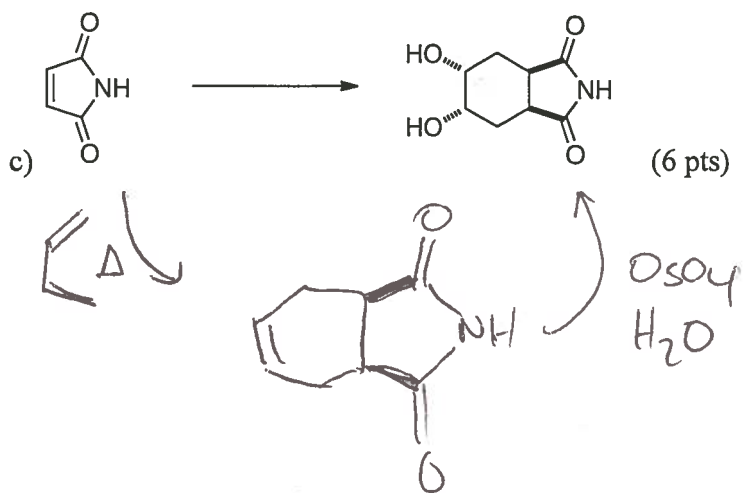
5) Complete the following syntheses using any organic molecule of 4 carbons or less and any reagents you need. You do not have to show the synthesis of the 4-carbon or less molecule you use. If your synthesis requires more than one step, provide the product after each step. All chiral products are racemic mixtures.



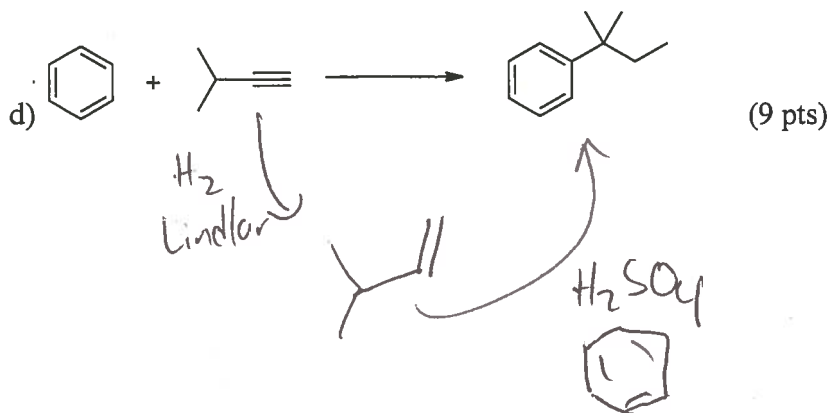
every step 3
10 reversed -3



Every step 3
 If reversed -3
 any mistake in reagent
 -1

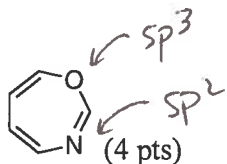
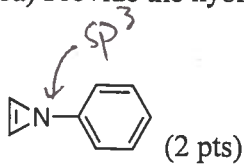


MCPBA / H₂O⁺
 -2



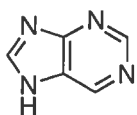
every step 3

6a) Provide the hybridization of the **oxygens** and **nitrogens**.



No Partial Points

b) Are the following molecules aromatic, anti-aromatic, or does this designation not apply? (3 pts each)



Aromatic



N/A



Aromatic

No Partial Point