NAME (Print): _____

SIGNATURE: _____

Chemistry 320N
Dr. Brent Iverson
10th Homework
April 8, 2026

Please print the first three letters of your last name in the three boxes

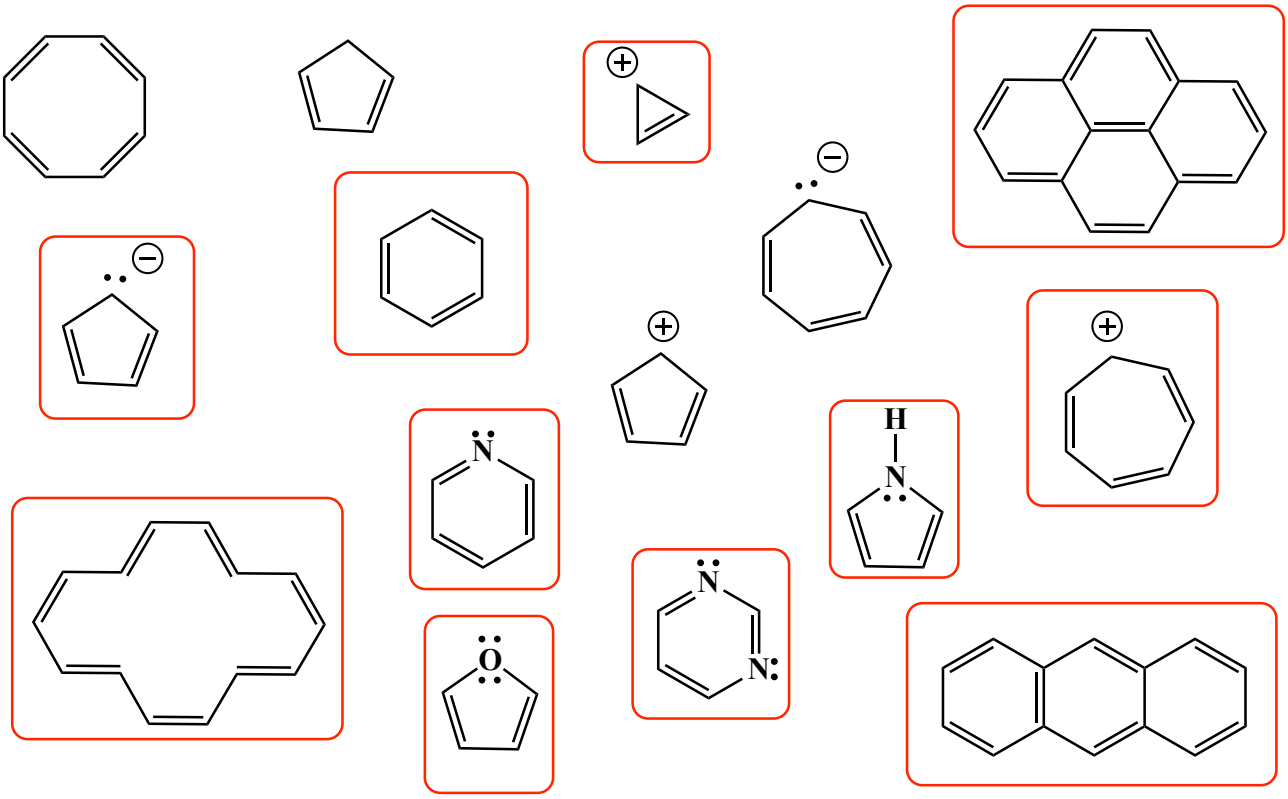
1. (1 pt. each) Here are a number of statements regarding conjugation and light absorption/ emission. Do not second guess yourself, this is not meant to be tricky! **Check the appropriate box to indicate whether the statement is true or false.**

	True	False
A. When using molecular orbital theory, it is best to think of electron density as being like waves, since it is described mathematically using wave equations.	X	
B. When molecules absorb light, electrons are excited from a bonding to an antibonding molecular orbital.	X	
C If a substance absorbs blue light, it will appear blue to our eyes.		X
D. The larger the number of pi bonds involved in a conjugated molecule (a "pi-way") the smaller the energy gap between the higest occupied pi molecular orbital and the lowest unoccupied molecular orbital.	X	
E. A reaction is said to be under kinetic control if the ratio of products is dependent on the relative energies of the products.		X
F. A reaction is said to be under thermodynamic control if the ratio of products is dependent on the relative energies of the products.	X	
G. Fluorescence occurs when a photon is emitted as an electron relaxes from an antibonding molecular orbital back to a bonding molecular orbital in a molecule that has absrbed light.	X	
H. Phosphorescence occurs when a chemical reaction generates a product in an excited state.		X
I. Phosphorescence occurs when an electron must flip its spin before relaxing back to a bonding molecular orbital while emitting a photon.	X	
J. The light from a green laser will go through your finger, while the light from a red laser is absorbed.		X

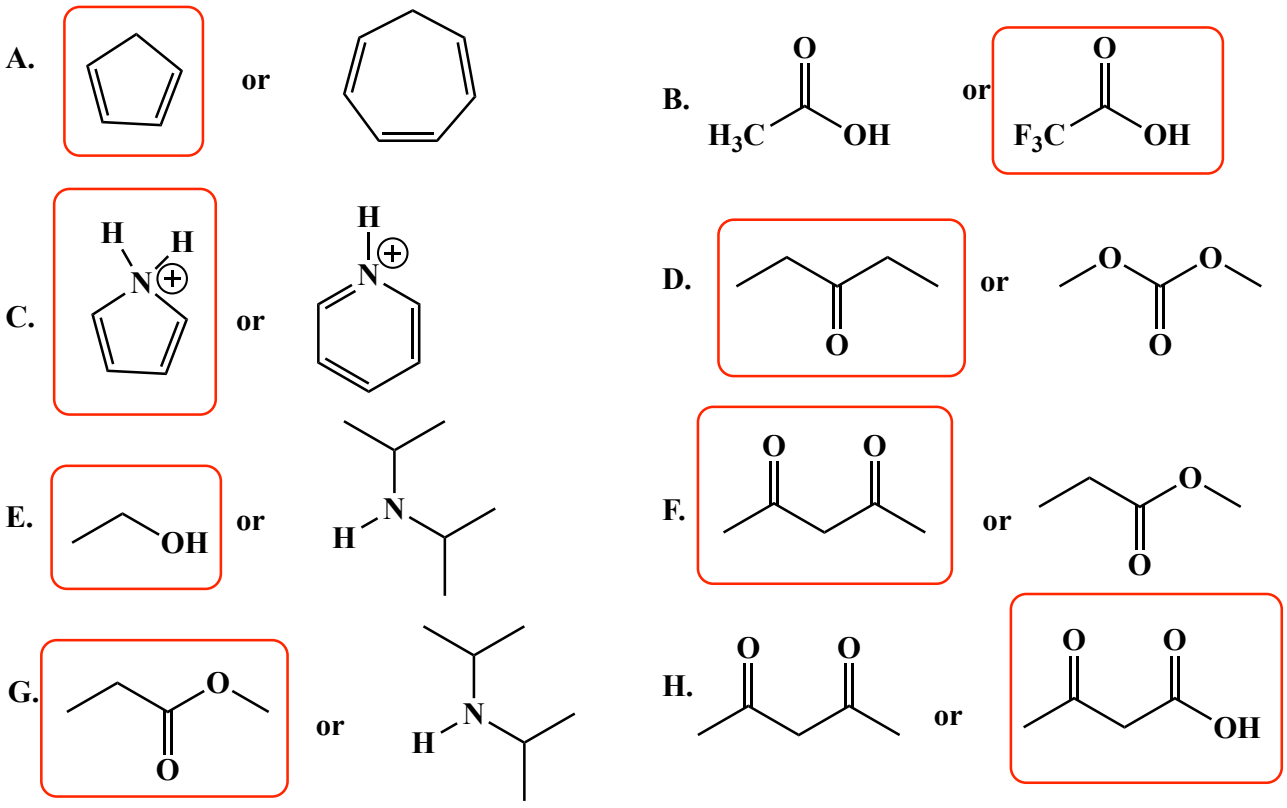
2. (8 points) Aromaticity is a term that refers to molecules with characteristic pi systems. A theorist named Hückel helped to derive several criteria that can be used to determine if a molecule is aromatic. List all four of these criteria:

1. The molecule is flat
2. All atoms of the ring must be sp^2 (or sp in rare cases) hybridized
3. The molecule is monocyclic
4. There must be "4n + 2" pi electrons in the pi system, where n = 0, 1, 2, 3, 4, 5,.....

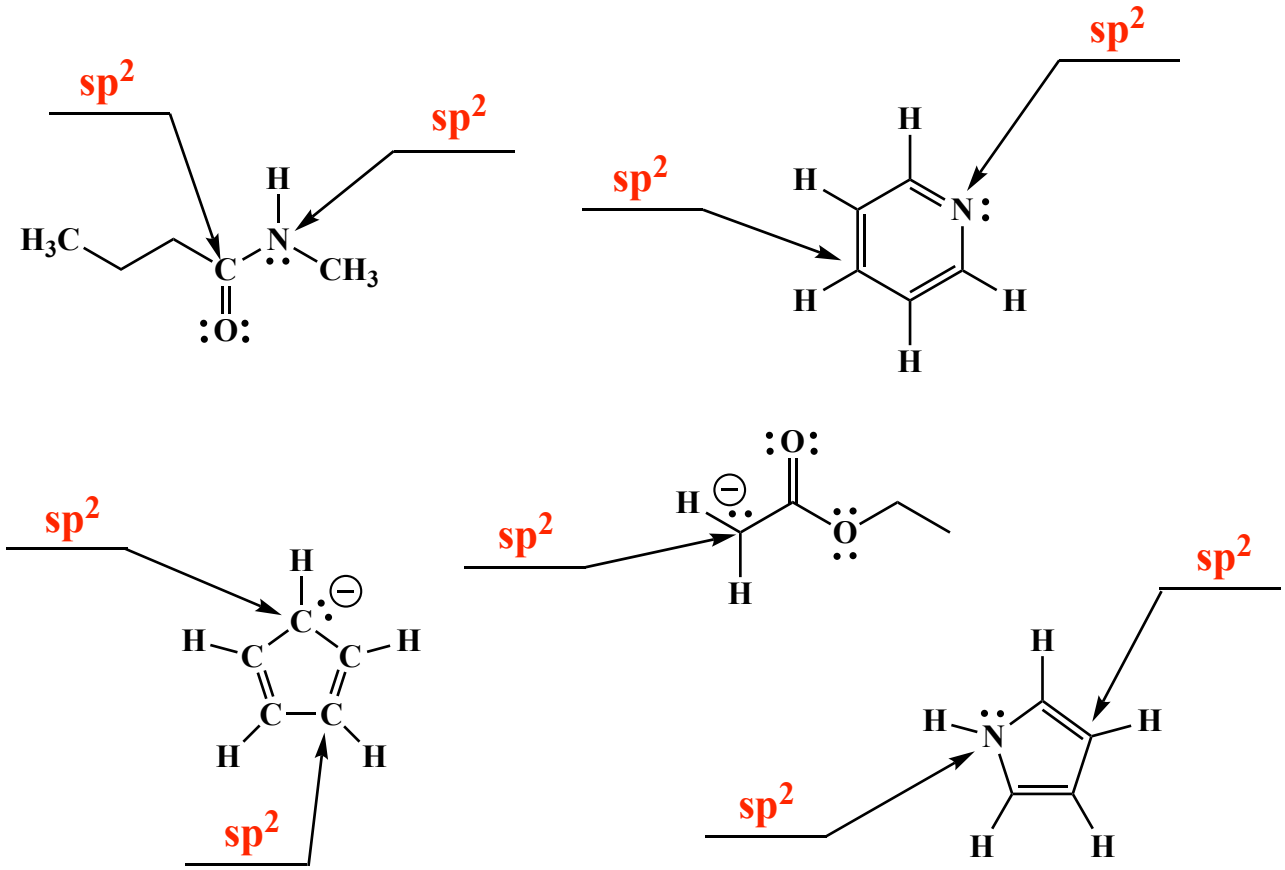
3. (15 points) **Draw a circle around** all of the molecules below that **can be considered aromatic.**



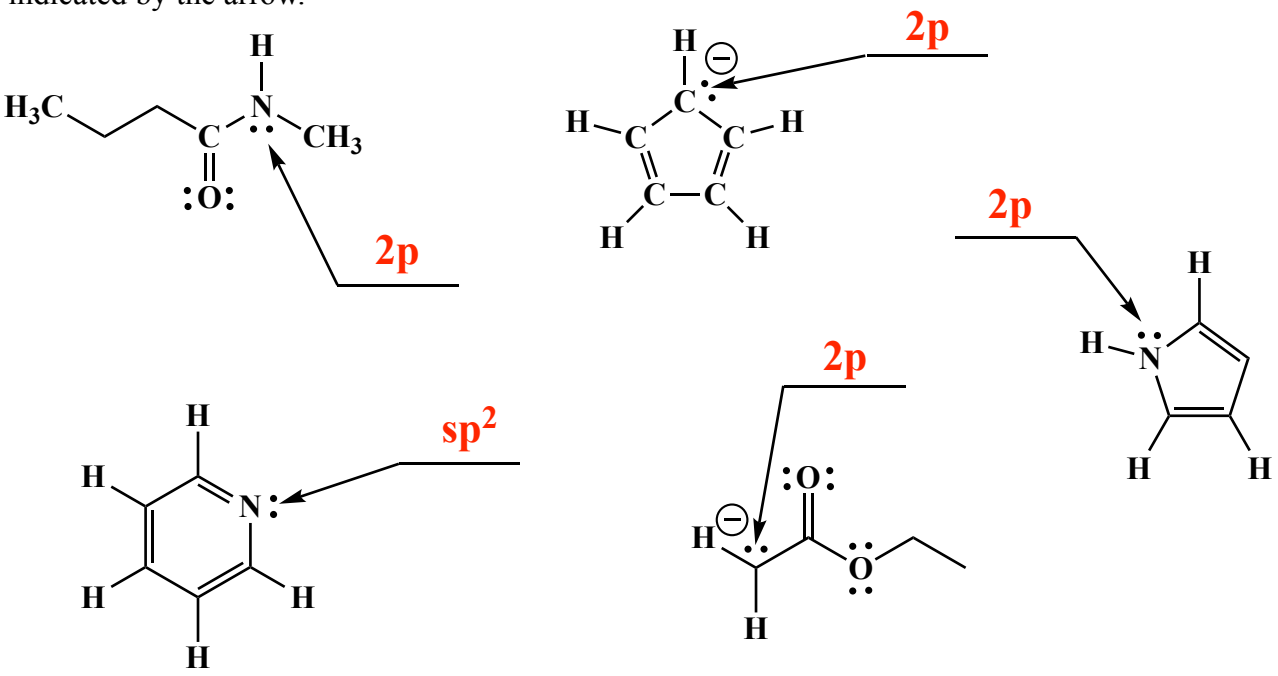
4. (16 points) **For each pair of molecules, circle the one that is more acidic.**



5. (9 points) On the lines provided, state the **hybridization state of the atom** indicated by the arrow.



6. (5 points) On the lines provided, state the **atomic orbital that contains the lone pair** of electrons indicated by the arrow.



7. For each of the following, fill the molecule in the box that is the product or products of the given reaction. When a racemic mixture of enantiomers are formed, draw both using wedges and dashes and write racemic.