Quiz 2, version 1, Printed Name:__________________________________________

Discussion Section (Day/Time/Al):_____________________________________

1. Provide pKa values for the most acidic proton on each molecule below. Do NOT round here. (4 points)

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H2O  CH3COOH  CH3NH3  CH3CH2CH=CH2  CH3CH2CHO  CH3CH2COOH  HCl  CH3CH2NH2
```

2. Provide correct structures in the boxes for the conjugate acid (CA) or conjugate base (CB) for the following compound. If a compound does NOT have a CA or CB, then just put a BIG X in the box; blank answers will be not be counted for credit. (4 points)

```
\[ \text{CA?} \quad \text{CB?} \]
```

3. There are two separate problems below; due to space constraints two problems are next to each other separated by the bold line. Put the following acidic protons in order of acid strength. (6 points)

```
\[ \text{Ha} \quad \text{Hb} \quad \text{Hc} \quad \text{Hd} \quad \text{He} \quad \text{Hf} \]
```

4. Considering the given pKa values, determine which direction the following equilibrium lies and circle the arrow for the direction the reaction goes. Then provide in the boxes who is the acid (A), the base (B), the conjugate acid (CA) and the conjugate base (CB) for the reaction direction you decide. Finally, provide a Keq constant. (Rounding is ok in this problem if necessary.) (4 points)

```
pKa  15

\[ \text{Cyclohexene} + \text{NaSCH}_3 \quad \text{Cyclohexene}^+ \text{Na}^+ \quad \text{Cyclohexene} \quad \text{NaSCH}_3 \quad \text{pKa}  7 \quad \text{CH}_3\text{SH} \quad \text{Keq} = \_\_\_\_
```

TURN OVER
5. Complete the following reactions using the appropriate arrows. Determine the direction of the equilibrium, and the $K_{eq}$. Write the pKa values under the acids (rounding is ok in this problem), so we can evaluate your progress better and give you credit for the pKa even if the values are incorrect. Finally, label the acid \( (A) \), base \( (B) \), conjugate acid \( (CA) \) and base \( (CB) \) correctly. Blank answers or guesses without worked out answers will not be counted for credit. (6 points)

\[
\text{O} \quad \text{O-H} + \text{H-NH}_2 \quad \rightarrow
\]

Direction of equilibrium: $\leftrightarrow$ OR $\rightarrow$ (circle one) $K_{eq} =$ __________

Label as A, B, CA and CB accordingly:

\[
\text{NaH}
\]

Direction of equilibrium: $\leftrightarrow$ OR $\rightarrow$ (circle one) $K_{eq} =$ __________

Label as A, B, CA and CB accordingly:

6. The following base has two basic sites of varying reactivity. Using correct arrows, protonate at the most basic site and then show why this site makes the most stable conjugate acid. (4 points)

\[
\text{O} \quad \text{O} \quad \text{H-Br} \quad \rightarrow
\]