1) Determine whether the following pairs of structures are different compounds or resonance structures of the same compound.



- 2) In the following sets of resonance structures, label the major and minor contributors and state which structures would be of equal energy. Add any missing resonance forms.
 - a) $\begin{bmatrix} CH_{3} \ddot{C}H C \equiv N : \leftrightarrow CH_{3} CH = C = \ddot{N} : \end{bmatrix}$ b) $\begin{bmatrix} 0 & 0 & 0 & 0 \\ CH_{3} - \dot{C} = CH - \dot{C}H - CH_{3} & \leftrightarrow CH_{3} - \ddot{C} = CH - CH_{3} \end{bmatrix}$ c) $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ CH_{3} - \ddot{C} - \ddot{C}H - C - CH_{3} & \leftrightarrow CH_{3} - \ddot{C} = CH - CH - CH_{3} \end{bmatrix}$ d) $\begin{bmatrix} CH_{3} - \ddot{C}H - CH = CH - NO_{2} & \leftrightarrow CH_{3} - C = CH - CH - CH_{3} \end{bmatrix}$
 - e) $\begin{bmatrix} NH_2 & NH_2 \\ CH_3 CH_2 C NH_2 & \longrightarrow & CH_3 CH_2 C NH_2 \end{bmatrix}$

3) Draw the important resonance forms to show the delocalization of charges in the following ions.



- 4) For each pair of ions determine which is more stable. Use resonance to explain your answer.
 - ++a) $CH_3 - CH - CH_3$ $CH_3 - CH - OCH_3$ ++b) $CH_2 = CH - CH - CH_3$ $CH_2 = CH - CH_2 - CH_2$ c) $CH_2 - CH_3$ $CH_2 - C \equiv N$: CH_2^+ CH_2^{+} d) e) $CH_3 - N - CH_3$ $CH_3 - CH - CH_3$ $CH_3 - C - CH_3$ $CH_3-C-CH_3\\$ +