1) Predict the major product of each of the following reactions (6 points): 2pts/each

a) \[ \text{Claisen Rearrangement.} \]

b) \[ 6 \pi \text{ elec} \text{ cycl} \text{ic Rxn} \]

c) \[ 8 \pi \text{ elec} \]

2) Propose a mechanism for each of the following reactions or transformation (6 points). 2pts/each

a) \[ \text{Diels - Alder} \]

b) \[ [1,5] - \text{sigmatropic} \]

c) \[ \text{Diels - Alder} \]
3) When 5-deutero-5-methyl-1,3-cyclopentadiene is warmed to room temperature, it rapidly rearranges, giving an equilibrium mixture containing the original compound as well as the other. Propose a plausible mechanism for the formation of the following compound. (2 points)

\[ \text{[1,5]-sigmatropic} \]

4) Provide a systematic name for each of the following compounds (2 points):

- **(a)** \[ \text{1,4-diisopropylbenzene} \]
- **(b)** \[ \text{2-chloro-4-nitrophenol} \]

5) Draw a structure for each of the following compounds (2 points):

- **(a)** Aniline
- **(b)** para-Xylene

6) Identify which of the following are aromatic (2 points):

- **(a)**
- **(b)**
- **(c)**
- **(d)**
- **(e)**