1. (12 pts) Quick answers from Jones, Chapters 8-10.2:
   (a) (2 pts) Which of the following alcohols could you make via hydroboration/oxidation?
       \[ \text{OH} \quad \text{HO} \]

   (b) (2 pts) Circle the energy diagram for the exothermic reaction:
       \[ \text{E} \quad \text{Reaction Coordinate} \quad \text{Reaction Coordinate} \]

   (c) (2 pts) Circle the more stable carbocation:
       \[ \text{+} \quad \text{+} \]

   (d) (3 pts) Which one of the three dibromocyclohexanes below would expect from reaction of Br\(_2\) with cyclohexene:
       \[ \text{Br} \quad \text{Br} \quad \text{Br} \quad \text{B} \quad \text{Br} \quad \text{Br} \quad \text{C} \quad \text{Br} \]

   (e) (1 pt) Which one of the compounds as shown in (d) is chiral? A \[ \text{B} \]

   (f) (2 pts) In the equilibrium \( \text{H}_2 + \text{I}_2 \leftrightarrow 2 \text{HI} \), which side would be favored? Use these bond dissociation energies (BDEs) to determine whether the reaction is exo- or endothermic: H-H 104.2 kcal/mol; I-I 36.1 kcal/mol; H-I 71.3 kcal/mol. Now circle your expectation for the preferred side. \[ \text{Right} \quad \text{Left} \]
       Overall energy change = 104.2 + 36.1 - 2 x 71.3 = -2.3 kcal/mol i.e. exothermic

2. (8 pts) Reaction of cis-2-butene with hydrogen bromide gives racemic 2-bromobutane.
       \[ \text{HBr + } \quad \text{Br} \quad \text{Br} \quad + \quad \text{Br} \]

   (a) (4 pts) Show carefully (by writing a mechanism) the origin of the two enantiomers of 2-bromobutane.

   (b) (4 pts) In addition to the 2-bromobutane, small amounts of two alkenes isomeric with the starting material can be isolated. What are these two alkenes (draw and name them) and how (mechanism?) are they formed? (Hint: don’t forget all these reactions are reversible.)