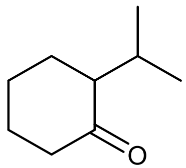
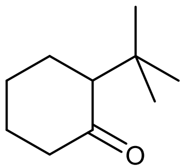
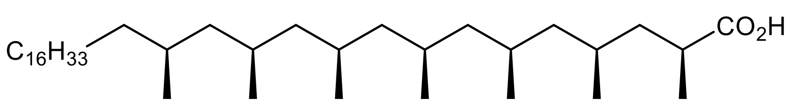
Problems 3

1. Estimate the preference for the equatorial orientation in cyclohexane of an isopropyl group and a *tert*-butyl group (*A*-value). Compare with the experimental values (2.15 and 5.0 kcal/mol)
2. Analyze the possible conformations of 1-isopropyl-2-methylcyclohexane (*cis*- and *trans*-). Identify steric interactions. Estimate the relative energy of the different conformers.
3. Consider the Barton nitrite-ester reactions of (1*S*,2*S*)- and (1*R*,2*S*)-2-isopropylcyclohexan-1-ol. Which reaction shows the higher stereoselectivity?
4. Expain the relatively small preference for the equatorial position of the substituent in the following ketons (*cf*. slide 89)





5. "Both the sugar acids and the sugar aldehydes tend to exist naturally in the ring form. However, it has been quite puzzling that the lactones from the sugar acid and the hemi-acetal from the sugar aldehyde prefer to form rings of different sizes." Brown *JACS* **1954**, *76*, 467. What are the respectively preferred ring sizes?
6. Phthioceranic acid is a polyketide with seven branching methyl groups. Describe the preferred conformation of the polymethylated segment.



7. Estimate the number of staggered conformations of a linear hydrocarbon $C_{n+3}H_{2n+8}$. Estimate the relative population at room temperature of the conformations with no, one and two gauche-segments.