

Problem 16, Chemistry 301X- 2006

In Problem 15, you did parts a and b.

**CHECK WITH A TA TO BE SURE YOU'RE RIGHT**

- (a) Construct the two MOs for a C—H bond from a carbon  $sp^3$  and hydrogen  $1s$  orbital
- (b) Make careful drawings of these orbitals.

NOW:

- (c) Draw staggered and eclipsed ethane. You may use your stick drawings from Problem 15.
- (d) What factor **DE**stabilizes the eclipsed form of ethane as compared to the staggered form? Consider the orbital interaction of the two filled coplanar C—H bonds.
- (e) What factor stabilizes the staggered form of ethane over the eclipsed form? Consider the two coplanar C—H bonds and the stabilizing interaction between filled and empty orbitals. “**What** filled and empty orbitals?” is the first question you should ask.