

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.