Quiz 9.1 – Valence Bond Theory

Name: _____

Valence Bond Theory

Consider an F_2 molecule from the perspective of valence bond theory. Draw the orbital overlap which leads to the covalent bond in F_2

Hybridization

For each class of hybridization, give the linear combination that forms one of the hybrid orbitals

- sp
- sp^2
- sp^3

Variational Theory

For a particle in a box with length $L = 1$, the ground state wavefunction is $\Psi = \sqrt{2}\sin(\pi x)$ and the ground state energy is $\dfrac{h^2}{8m}$

The normalized trial function $\phi = \sqrt{30}\left(-x^2 + x\right)$ has a similar shape and obeys the same boundary conditions. Demonstrate the variational theory by finding the energy expectation value $\left\langle \phi \middle| \hat{H} \middle| \phi \right\rangle$ and comparing it to the true ground state energy.

O Me! O Life!

By Walt Whitman

Oh me! Oh life! of the questions of these recurring,
Of the endless trains of the faithless, of cities fill'd with the foolish,
Of myself forever reproaching myself, (for who more foolish than I, and who more faithless?)
Of eyes that vainly crave the light, of the objects mean, of the struggle ever renew'd,
Of the poor results of all, of the plodding and sordid crowds I see around me,
Of the empty and useless years of the rest, with the rest me intertwined,
The question, O me! so sad, recurring—What good amid these, O me, O life?

Answer.
That you are here—that life exists and identity,
That the powerful play goes on, and you may contribute a verse.