3. Two distinguishable but equal-mass particles move and interact in three dimensions ($\vec{r}_i = (x_i, y_i, z_i)$) with the Hamiltonian

$$H = -\frac{\hbar^2}{2m}(|\vec{\nabla}_1|^2 + |\vec{\nabla}_2|^2) + \frac{k}{2}(|\vec{r}_1|^2 + |\vec{r}_2|^2) + g(x_1x_2 + y_1y_2 - 2z_1z_2) \ .$$

Solve for the ground state wavefunction $\psi_0(\vec{r}_1, \vec{r}_2)$ when it exists, and say for what range of g it does exist (assume both m and k are positive).