Review of questions (not an assignment):

1. What is nanotechnology ? Why is writing "IBM" with atoms considered nanotechnology, but not doing a chemical reaction, where atoms do bind or unbind at nanometer length scales.
2. What are the essential components of DLVO theory, and why do rivers silt ?
3. How would you control the crystallization of monodisperse carboxylic acid-coated polystyrene spheres in suspension. What kinds of crystals could you obtain ? How would you know what structures have formed ?
4. Why do polymer chains refuse to interpenetrate, and how can this be used to stabilize sols ?
5. Describe the process of acquiring $\pi - A$ isotherms using a Langmuir trough. What are the parallels between the $\pi - A$ isotherms and the way gases are compressed ? Do you need polar molecules for Langmuir monolayers to form ?
6. Describe the various chemistries of forming self-assembled monolayers. In the case of thiols on gold, what are the structural characteristics, and how are these obtained experimentally.
7. Describe two ways of nanopatterning SAMs of thiols on gold.
8. How are clusters prepared in the gas phase and size selected. Why does cluster formation require expansion of the gas that carries metal vapor.
9. What are jellium models for clusters of metal atoms ? How are jellium-derived magic numbers different from magic numbers for rare-gas clusters.
10. Describe all the shell-structure hierarchies in metal clusters of thousands of atoms.