1. a. Draw a diagram showing the locations of several residences that are near each other. Indicate on your diagram the shortest functional and the shortest physical distance between these residences.

b. Label each residence (A, B, C, etc.). In words or with a chart, rank order how much the different residents (A, B, C, etc.) would interact, from most interaction to least interaction. Label your chart clearly.

c. Generate some hypothetical data (values) showing that functional distance is more important than physical distance for interaction. Is this effect stronger for low-income or wealthy people? Use your data values to demonstrate your opinion. Provide research examples to support why the impact of increased functional distance might be more adverse to one group over another.

d. Given the effects you’ve shown of income differences on functional distance, is this concept an example of environmental determinism or cognitive appraisal? Please explain why.

e. Describe a design element, other than distance, to help low-income residents cope with urban renewal.

2. a. What does the expression “canary in the coal mine” refer to? How is it relevant to behavioral toxins and both science and policy?

b. Describe what each of the following means and provide an illustration from research on either lead or PCBs of the concept (ok to mix lead and PCBs for different research examples).

   i. subclinical effects
   ii. critical period
   iii. multiple effects

c. An economist argues that we should change the current level of permissible body lead burden in the US among human beings from 10 ug/dl blood to 15, since this would only change the average IQ of children in the US by a small amount, on the order of about 3 points. He argues that “…this is an example of over-regulation, or interference with the free market, since people can choose where they live. If people are worried about lead exposure, they can simply choose to live someplace else.”

   The economist continues, “Furthermore, this strict regulation actually hurts poor people more, since it makes industrial production less efficient; this means fewer jobs, particularly for unskilled or low paid laborers. In other countries, like China, the regulations are less strict so they get a competitive advantage over America which also hurts workers.”

   “Finally,” he points out. “There is no complete scientific proof that lead is harmful or causes IQ reductions. Thus, given the US law, we shouldn’t be regulating lead so strictly.”

   i. Point out three aspects of his position that are accurate and explain why.
   ii. Generate three arguments against his position and explain the counter-arguments.

d. Low SES children are affected more severely by the same level of PCB exposure in comparison to high SES children.

   i. Choose one known PCB impact on children and describe that impact.
ii. Using your chosen PCB impact, please provide one biological, one physical-environmental, and one psychosocial-environmental reason you can think of that might cause the differential vulnerability for low SES children. **Explain the logic of your answers.** Note this is a thought question: little or no actual data on the reasons for this statement exist. Your arguments for your answer, however, do have to link up with actual facts or theories in reading/lecture about behavioral toxicology.

3. a. Describe at least three different things this graph shows or implies.
   b. Describe one potential policy implication from this graph.
   c. Describe three weaknesses in the scientific evidence.
   d. Design an ideal experiment, with human beings, in order to shore up the scientific quality of the evidence. You do not have to incorporate ethical issues into your experiment.
4. a. What is the relation between this experiment, by Calhoun, and Malthus’ theory of carrying capacity?
   b. Are there any human data that look similar to what Calhoun found?
   c. Using what you know about crowding from human studies, describe two additional measures you would add to Calhoun’s experiment. Explain what you would expect to see in these two measures, and why. Draw upon prior research/theory to substantiate your arguments.
   d. For one of your measures, generate some hypothetical data that would support the conclusion that the rats responded similarly to crowding as humans. For your second measure do the opposite. Please explain your answers.

5. a. There are several different aspects of measuring human density. A researcher produces data showing that the number of people per acre in one country is much higher than in another country, but the crime rates are actually lower in the country that is more crowded. Provide at least two criticisms of the researcher’s approach to measuring density. What would be a better way to evaluate the relation between crowding and crime? Explain your answer.
   b. Assuming crowding affects aggression the way noise does, describe the conditions under which you would expect to see crowding related to aggression, assuming this parallel between noise and aggression research.
   c. Describe three different types of evidence that indicate crowding can influence human health and behavior. For one of the types of evidence, describe which theory of crowding fits your evidence best. Physiological stress would be one type of evidence. Thus, you could not use blood pressure results and stress hormone results as two different types of evidence.
   d. Develop a new experiment (lab or field) to test the overstaffing/manning theory of crowding. Explain this theory and then describe the logic of how your research would test the role of overstaffing/manning. Generate some hypothetical data values consistent with this theory, and explain how your hypothetical data support this theory. Label any tables and charts clearly.