AP Statistics AP Exam Review Homework #2

Question 1 is a regular AP question---12 minutes to complete while #2 is a #6 –type question ---25 minutes to complete)

1. Two antibiotics are available as treatment for a common ear infection in children.
- Antibiotic A is known to effectively cure the infection 60 percent of the time. Treatment with antibiotic A costs $50.
- Antibiotic B is known to effectively cure the infection 90 percent of the time. Treatment with antibiotic B costs $80.

The antibiotics work independently of one another. Both antibiotics can be safely administered to children. A health insurance company intends to recommend one of the following two plans of treatment for children with this ear infection.
- Plan I: Treat with antibiotic A first. If it is not effective, then treat with antibiotic B.
- Plan II: Treat with antibiotic B first. If it is not effective, then treat with antibiotic A.

(a) If a doctor treats a child with an ear infection using plan I, what is the probability that the child will be cured?
  If a doctor treats a child with an ear infection using plan II, what is the probability that the child will be cured?

(b) Compute the expected cost per child when plan I is used for treatment.
  Compute the expected cost per child when plan II is used for treatment.

(c) Based on your results in parts (a) and (b), which plan would you recommend? Explain your recommendation.

_____

2. Lead, found in some paints, is a neurotoxin that can be especially harmful to the developing brain and nervous system of children. Children frequently put their hands in their mouth after touching painted surfaces, and this is the most common type of exposure to lead. A study was conducted to investigate whether there were differences in children's exposure to lead between suburban day-care centers and urban-day care centers in one large city. For this study, researchers used a random sample of 20 children in suburban day-care centers. Ten of these 20 children were randomly selected to play outside; the remaining 10 children played inside. All children had their hands wiped clean before beginning their assigned one-hour play period either inside or outside. After the play period ended, the amount of lead in micrograms (mcg) on each child's dominant hand was recorded.
The mean amount of lead on the dominant hand for the children playing inside was 3.75 mcg, and the mean amount of lead for the children playing outside was 5.65 mcg. A 95 percent confidence interval for the difference in the mean amount of lead after one hour inside versus one hour outside was calculated to be (-2.46, -1.34).
A random sample of 18 children in urban day-care centers in the same large city was selected. For this sample, the same process was used, including randomly assigning children to play inside or outside. The data for the amount (in mcg) of lead on each child's dominant hand are shown in the table below.

Urban Day-Care Centers

Inside	6	5	4	4	4.5	5	4.5	3	5
Outside	15	25	18	14	20	13	11	22	20

(a) Use a 95 percent confidence interval to estimate the difference in the mean amount of lead on a child's dominant hand after one-hour of play inside versus an hour of play outside at urban day-care centers in this city. Be sure to interpret this interval.

(b) Is there a significant difference in the mean amount of lead on the hands of the two different groups of urban day-care children after one hour of play? Support your evidence with statistical justification.

(c) On the figure below,
- Using the vertical axis for the mean amount of lead, plot the mean amounts of lead on the dominant hand of children who played <u>inside</u> at the suburban day-care center and then plot the mean for the amounts of lead on the dominant hand of children who played <u>inside</u> at the urban day-care center.
- Connect these two points with a line segment.
- Plot the two mean (suburban and urban) for the children who played <u>outside</u> at the two types of day-care centers.
- Connect these two pints with a second line segment.
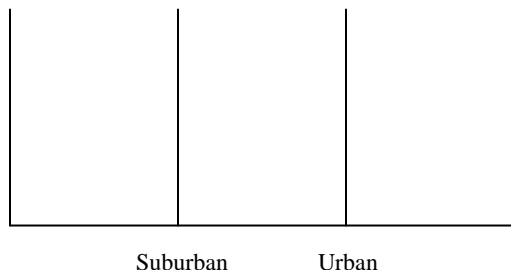
Suburban   Urban

(d) From this study, what conclusions can be drawn about the impact of setting (inside, outside), environment (suburban, urban), <u>and</u> the relationship between the two on the amount of lead on the dominant hand of children after play in this city. Justify your answer.