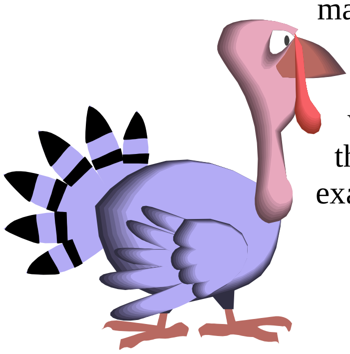
AP STATISTICS FREE RESPONSE — Name: ________________________

Chapter 5 Producing Data — Date: ________________________

Read the directions for each problem carefully. Be sure to answer the questions asked, and be as complete and concise as possible. Where applicable, box in your final answers.

Turkeys raised commercially for food are often fed the antibiotic *salinomycin* to prevent infections from spreading among the birds. However, salinomycin can damage the birds' internal organs, especially the pancreas. Carol has just received her Turkey Engineering degree from N.C. State and believes that a combination and selenium and vitamin E in the birds' diets may prevent injury. She wants to explore the effects of different dosages of selenium—100 or 200 µg at each feeding—and vitamin E—3, 10, or 100 mg at sunrise—added to the turkey's diets. When the study is to begin, 48 turkeys will be randomly selected from the brood and made available for the study. At the end of the study, the birds will be killed ☹ and the condition of their pancreas examined with a microscope. Use this set-up for #1-8 below.



(1) **(2 points)** What is the response variable in this study?

(2) **(5 points)** How many explanatory variables does this study have? What are they? What is a vocabulary word for *explanatory variables*?

(3) **(6 points)** Outline in diagram form an appropriate design for Carol's experiment. In your diagram, be sure to cover all of the important sample design concepts that we've discussed.

(4) **(6 points)** Use the random digit table starting at line 128 to select the turkeys that will be assigned to the first treatment group. Be sure to indicate how you labeled the turkeys and include all of the appropriate elements of a complete design.

(5) **(5 points)** Explain *confounding* in the context of this problem. Give an example of a confounding variable other than the turkeys' gender and explain why it could be a problem here.

(6) **(6 points)** Before the forty-eight turkeys are randomly selected, Emily points out during the morning announcements that the internal mechanisms of female turkeys differ significantly from that of males, and that this fact might skew the results. What is this called?

What can Carol do about it? Using a different color writing utensil, indicate on your diagram from (3) where this would take place and what would change. (You do NOT have to redraw your entire diagram from (3), you do, however, need to tell me here__________________________ which writing device you are using for this problem.)

What is this type of sampling called?

(7) **(2 points)** What if Emily hadn't made her observation about gender affecting the results until after the forty-eight turkeys had been selected? Is there anything that Carol could do at that point? If so, what is this called?

(8) **(3 points)** Could Carol's experiment be double-blind? Explain.

(9) **(5 points)** Guesses on the value of π from Sanderson students are approximately normally distributed with mean 3.1 and standard deviation 1.1. What is the probability that a Sanderson student will give an estimate over 4.0? Draw a picture.

Even though I'm sure that you picked up on it right away, what element of good statistical design was missing from the above question?

In an article for the social page of the newspaper, Amanda states that 80% of all apartment dwellers in a large city deadbolt their doors in addition to locking them as an added precaution against burglary. Brian, being a natural skeptic and nosy as well, wants to check this. He tries ten apartment doors (selected at random, of course) and finds that only *six* of them are deadbolted! Is this good evidence that Amanda's assertion was incorrect? Brian decides to run a simulation. Use this set-up for questions #10-12.

(10) **(5 points)** Describe how you would simulate an SRS of ten apartment dwellers to see how many of them have deadbolted doors. Be sure to give all of the details of a good simulation scheme.

(11) **(5 points)** Starting at line 113 in the random digit table, perform your simulation five times. For each run, report to me the number of apartment dwellers (out of ten) who had deadbolted doors. What is the proportion of times that six (or fewer) apartment dwellers out of ten had their doors locked?

(12) **(1 point)** One last, little, teensy question: *WHY* did Brian run a simulation here?