Instructions: Write the answers and show all your work in the bluebooks. There are 6 questions. Be sure to do all 6. You do not need to simplify answers. (I prefer final answers in the form of a fraction rather than a decimal. Throughout, when an item is selected “at random” from a group of items it means that each item in the group is equally likely to be selected.)

1. (5 points) A builder must install 10 windows and 3 doors in a new house. There are 7 types of windows and 2 types of doors to choose from. How many distinct arrangements of windows and doors are possible? (Windows and doors need not all be of the same type, and a given type may be used more than once.)

2. (8 points) A farmer gathers 36 eggs from the henhouse, 15 white eggs and 21 brown eggs. He then distributes them at random among 3 cartons of 1 dozen each. What is the probability that each carton will receive 5 white eggs?

3. (4 points) A student taking a test guesses the answers to a question which involves matching 3 words with their definitions. What is the probability that the student will get at least one word correctly paired with its definition?

4. (8 points) Each day the Professor chooses one route at random from among 10 possible routes for his walk home from the office. What is the probability that he will walk home by a different route on each of 5 consecutive days?

5. (5 points) Choose a word at random from the sentence “Weeding is my favorite activity” and then select a pair of letters (without replacement) at random from the chosen word. Find the probability that the letters are the same. (Hint: Partition the sample space according to which word is chosen.)

6. (5 points) (Refer to the situation in problem 5.) Given that one of the selected letters is an “i”, what is the probability that the word “is” was chosen? (Hint: Bayes’ formula.)