Quiz 4: Conditional probability
(taken on Mon Jan 23)

You may work with in a group of as many as three students on this quiz, handing in one quiz with all names, provided that you all contribute to the work.

For questions 1 – 3, suppose that you encounter two traffic lights on your commute to school. Based on past experience, you judge that the probability is .45 that the first light will be red when you get to it, .35 that the second light will be red, and .25 that both lights will be red.

1. Determine the conditional probability that the second light will be red, given that the first light is red. (Here and throughout, show the details of your calculations.)

2. Are the events \{first light is red\} and \{second light is red\} independent? Justify your answer.

3. Given that at least one light is not red, what is the probability that neither light is red? (Show your work.)

For questions 4 – 5, suppose that two sports teams (call them the Domestic Shorthairs and the Cache Cows) play a series of games until one team has won twice. (So, if the same team wins each of the first two games, the series ends there. But if each team wins one of the first two games, then the series continues to a third and final game.) Suppose that the Domestic Shorthairs are the better team and have a .6 probability of winning each game. Also assume that the games are independent.

4. Determine the probability that the series takes three games to complete. (Show your work.)

5. Determine the probability that the Domestic Shorthairs win the series. (The winner of the series is the team that wins two games.)