Assignment 2

1 My neighbor's children

My neighbor has two children. Assume that the gender of a child is a coin flip. Let the genders of the children be G_1 and G_2. For all questions, express the probability symbolically (e.g. "$P(A|B)$") and give the value.

1. Suppose I happen to see one of his children run by, and it is a boy. What is the probability that the other child is a girl?

2. Suppose instead that I ask my neighbor whether he has any boys, and he says yes. What is the probability that one child is a girl?

3. Suppose I ask my neighbor if either of his children is a boy and also born on a Tuesday. What is the probability that one child is a girl?

2 Monty Hall

In the Monty Hall game show, you play the contestant. You are presented with three doors and told that one door has a desirable prize (a car) and the other two have undesirable prizes (goats). You get to choose one door, and you will receive the prize behind it. For all questions, express the probability symbolically (e.g. "$P(A|B)$") and give the value.

1. The host picks a door at random and opens it, showing you the prize behind it. In this case, the host reveals a goat. What is the probability that each of the remaining doors has a car?

2. Instead, you choose a door. The host chooses one of the two remaining doors at random, showing you the prize behind it. In this case, the host reveals a goat. What is the probability that each of the remaining doors has a car?

3. Instead, you first choose one door, and the host opens whichever one of the remaining two doors has a goat behind it (or, if both have a goat, one at random). What is the probability that each of the remaining doors has a car?