

Stat 230

May 15 Demo/ Practice problems

All the problems are ungraded.

Pr. 1 Pitman 1.4.2

Pr. 2 Pitman 1.4.4

Pr. 3 Pitman 1.4.6

Pr. 4 Pitman 1.4.10

Pr. 5 True or false: If A is independent of B , is A also independent of B^c ?

Pr. 6 [The Monty Hall problem]

A player is attending a tv quiz where they can win a car.

There are 3 doors. Behind one of them there is a car, and behind the other 2 doors there is a goat.

The player first selects any door.

The host then opens a door the player did not select, and a goat is revealed. The host then presents the player with the opportunity to switch doors from 1 to 3.

Should the player take the offer?

We are assuming that the host will always present the offer. The door that the host opens is randomly selected among the doors that

- The player hasn't selected;
- Behind which there is a goat.

To setup the problem, let us use the following notation:

- Let C be the unknown door behind which the car is (so $C= 1,2$ or 3 , each with some probability)
- Let G be the door that the player initially guesses.
- Let S be the door that the host opens.

Problem:

- Without lack of generality, assume the player chooses door 1, and that the host opens door 2. (We can always relabel the doors) Formulate the problem "Should the player switch from door 1 to door 3" in terms of conditional probability and C, G and S .
- Solve the problem you came up with in a).
You may assume $\Pr(C=1)=\Pr(C=2)=\Pr(C=3)=1/3$.