Quiz 1

2016. 3. 22

1. [2 pts each] Roll two fair dice and let D1 and D2 be the numbers shown on die 1 and 2, respectively. Also define events as follows.

   E1: Event that D1 = 3

   E2: Event that D1 + D2 is even numbers

   E3: D2 >= 4

   a) Compute Pr(E1), Pr(E2) and Pr(E3)

   b) Compute Pr(E1 | E2), Pr(E2 | E1∩E3), and Pr(E1∩E2 | E3)

2. [2 pts] Assume that H1 and H2 are independent events and H2 and H3 are also independent. Then, are H1 and H3 independent also? Prove or give a counter example.

3. [4 pts] Cancer diagnoses problem.
Suspecting that a patient have a cancer, a doctor is performing two examinations. The tests are a) weight loss and b) existence of CEA (carcinoembryonic antigen). Cancer patients suffers from weight loss with probability 0.6 and possess CEA with probability 0.8. The test results of the patient are weight loss and observation of CEA. Assuming that the probability that the patient has cancer before the test, Pr(H), is 0.5. What is the updated probability of the patient having cancer given the test results?

*Updated 3.14
Possession of CEA and weight loss are independent.
People who are not having cancer suffer weight loss with probability 0.2,
and possess CEA with probability 0.1