機率學小考　2015.04.08

1. Professor Right answers a question incorrectly with probability 1/4, independent of other questions. In each lecture, he is asked 0, 1, 2, or 3 questions with probability 1/2, 1/4, 1/8, 1/8 respectively. What is the probability that she answers no questions incorrectly in a lecture?

2. Alvin's walking time to work is between 10 and 20 minutes in a sunny day, and between 15 and 30 minutes in a rainy day, with all times being equally likely in each case. A day is sunny with probability 5/6 and rainy with probability 1/6. What is the PDF of the walking time X?

3. Consider a continuous random variable X uniformly distributed over the interval $[0, 2\pi]$. What is the expectation and variance of X?

4. Consider 100 independent tosses of a coin, whose head comes up in each toss with probability 0.2. What is the mean and variance of X, the total number of heads?

5. The time until a small meteorite first lands anywhere in the Sahara desert is modeled as an exponential random variable with a mean of 3 hours. The time is currently midnight. What is the probability that a meteorite first lands sometime between 1 a.m. and 2 a.m. or between 5 a.m. and 6 a.m. of the first day?