Exam II for CS 3332 機率統計

3:20 ~ 5:10 p.m., November 12, 2004

1. (20%) Suppose there are only nine white-eyed fruit flies in a container of 40 flies. An inspector selects five flies randomly without replacement to examine.
   (a) (5%) Find the probability of at least four white-eyed fruit flies in this inspection.
   (b) (5%) How many items should be examined so that the probability of finding at least one white-eyed fruit fly exceeds 0.8?
   (c) (10%) If the selection is done at random but with replacement, repeat the questions (a) & (b).

2. (15%) Four distinct integers are chosen at random and without replacement from the set of the ten positive integers, {1, 12, 2, 24, 4, 34, 6, 68, 8, 9}. Let the random variable X be the second largest of these four numbers. Find its p.m.f.

3. (15%) Suppose the moments of X are $E\left(X^m\right)=(m+1)!2^m, m=1,2,3,\ldots$ Find $P(X>7.8)$.

4. (25%) X has a Poisson distribution.
   (a) (10%) If $P(X=1)=2P(X=2)$, compute $P(X=4)$ and $P\left(|X-\mu|<2\sigma\right)$.
   (b) (5%) If $P(X=0)=0.135$, find $P(X=3)$.
   (c) (10%) If $f(x)=\frac{4}{x}f(x-1), x=1,2,\cdots$, find $Var(X)$.

5. (10%) X has a gamma distribution with $\alpha=3$ and $\theta=2$, find $P(10.64<X\le 16.81)$.

6. (15%) If X is $b(n,p)$, show that $E\left(\frac{X}{n}\right)=p$ and $E\left(\left(\frac{X}{n}-p\right)^2\right)=\frac{p(p-1)}{n}$.