IMM - DTU

02405 Probability
2003-10-5
BFN/bfn

Solution for exercise 3.4.2 in Pitman

First we restate D : number of balls drawn to get two of the same colour. We draw one ball which is either red or black. Having drawn a ball of some colour the number of draws to get one of the same colour is geometrically distributed with probability $\frac{1}{2}$. Thus $D = X + 1$ where X is geometrically distributed with $p = \frac{1}{2}$.

Question a)

$$P(D = i) = p(1-p)^{i-2}, \qquad p = 2, 3, \ldots$$

Question b)

$$E(D) = E(X+1) = E(X) + 1 = \frac{1}{p} + 1 = 3$$

from page 212 or 476,482.

Question c)

$$V(D) = V(X+1) = V(X) = \frac{1-p}{p^2} = 2, \qquad SD(D) = \sqrt{2}$$

from page 213 or 476,482.