MA20104 Probability and Statistics

Answers Problem Set 3

1. $\frac{2N+1}{3}$

2. $4p(1-p)(1-2p)$

3.

4. $E(2X+3Y) = 2EX + 3EY$, $Var(2X+3Y) = 4VarX + 9VarY$

5. (a) $\left(1-\frac{1}{r}\right)^n$

    (b) $\left(1-\frac{2}{r}\right)^n$

    (c) $r\left(1-\frac{1}{r}\right)^n$

    (d) $r\left(1-\frac{1}{r}\right)^n \left[1-\left(1-\frac{1}{r}\right)^n\right] + r(r-1)\left[\left(1-\frac{2}{r}\right)^n - \left(1-\frac{1}{r}\right)^{2n}\right]$

6. $E(S_n) = 1$, $Var(S_n) = 1$

7. $Cov(X,Y) = -\frac{1}{3}$, $\rho(X,Y) = -\frac{1}{2}$