

1. Let  $X$  and  $Y$  be independent random variables, with  $E(X) = 1$ ,  $E(Y) = 2$ ,  $Var(X) = 3$ , and  $Var(Y) = 4$ .
  - a) Find  $E(10X^2 + 8Y^2 - XY + 8X + 5Y - 1)$
  - b) Assuming all variables are normally distributed, find  $P(2X > 3Y - 5)$   
*Pitman 5.3.2*
  
2. Let  $X$  and  $Y$  be independent and normally distributed,  $X$  with mean 0 and variance 1,  $Y$  with mean 1. Suppose  $P(X > Y) = \frac{1}{3}$ . Find the standard deviation of  $Y$ .  
*Pitman 5.3.5*
  
3. Let  $U$  and  $V$  be independent uniform(0,1) random variables.
  - a) Find the density of  $X = -\ln(U(1 - V))$
  - b) Compute  $E(X)$  and  $Var(X)$   
*Pitman 5.4.12*

c) Let  $X$  and  $Y$  have joint density  $f(x, y)$ . Find formulae for the densities of each of the random variables:

a)  $X - Y$

b)  $X + 2Y$

c)  $XY$

*Pitman 5.4.7*