Exercise 5.2. Suppose that X has moment generating function

$$M_X(t) = \frac{1}{2} + \frac{1}{3}e^{-4t} + \frac{1}{6}e^{5t}.$$

(a) Find the mean and variance of X by differentiating the moment generating function to find moments.

(b) Find the probability mass function of X. Use the probability mass function to check your answer for part (a).

Exercise 8.15. Let (X, Y) be a uniformly distributed random point on the quadrilateral D with vertices $(0,0)$, $(2,0)$, $(1,1)$ and $(0,1)$. Calculate the covariance of X and Y. Based on the description of the experiment, should it be negative or positive?