

The random variable  $X$  has probability generating function  $G_X(t)$  given by

$$G_X(t) = ct(1+t)^5,$$

where  $c$  is a constant.

**(a)** Find the value of  $c$ . [1]

**(b)** Find the value of  $E(X)$ . [2]

The random variable  $Y$  is the sum of two independent values of  $X$ .

**(c)** Write down the probability generating function of  $Y$  and hence find  $\text{Var}(Y)$ . [4]

**(d)** Find  $P(Y = 5)$ . [2]