

Toby has a bag which contains 6 red marbles and 3 green marbles. He randomly chooses 3 marbles from the bag, without replacement. The random variable X is the number of red marbles that Toby obtains.

- (a) Find the probability generating function of X . [3]

Ling also has a bag which contains 6 red marbles and 3 green marbles. He randomly chooses 2 marbles from his bag, without replacement. The random variable Y is the number of red marbles that Ling obtains. It is given that the probability generating function of Y is $— + +$.

The random variable Z is the total number of red marbles that Toby and Ling obtain.

- (b) Find the probability generating function of Z , expressing your answer as a polynomial in t . [3]

- (c) Use the probability generating function of Z to find $\text{Var}(Z)$. [4]