

## 1996 Paper 2 Question 4

### Probability

What is a *probability generating function*? [4 marks]

If a random variable  $X$  is distributed  $\text{Geometric}(p)$  then  $P(X = r) = (1 - p)^r p$ . Derive a probability generating function which is appropriate for the Geometric distribution. [4 marks]

Determine the expectation and variance of  $X$ . [3+3 marks]

A game which uses a fair die requires each player to throw a six to start. What is the number of times that a player may expect to throw the die before achieving the required six? [4 marks]

What is the variance of this number? [2 marks]