1995 Paper 1 Question 1

Discrete Mathematics

Take the identity \((1 + \alpha)^r(1 + \alpha)^s = (1 + \alpha)^{r+s}\) and use generating functions to derive Vandermonde’s convolution:

\[
\sum_{k \geq 0} \binom{r}{k} \binom{s}{r-k} = \binom{r+s}{r}
\]

Reach the same result by considering how many ways there are to choose \(r\) people from \(r\) men and \(s\) women. [10 marks]