1993 Paper 10 Question 11

Discrete Mathematics

Let $g : A \to B$ be a function with domain A and range B. Show that the relation R defined by

$$xRy \Leftrightarrow g(x) = g(y)$$

is an equivalence relation on A. [4 marks]

Let $f(n, r)$ be the number of surjections from a set A having n elements to a set B having r elements. Show that

$$f(n, r) = r\big(f(n-1, r-1) + f(n-1, r)\big). \qquad \text{[8 marks]}$$

Evaluate $f(n, r)$ in the cases:

(a) $r = 2$ [3 marks]

(b) $r = (n-1)$ [5 marks]