

DISCRETE MATHS (Q 6 & 7, PAPER 2)

2002

6 (a) Nine friends wish to travel in a car. Only two of them, John and Mary, have licences to drive. Only five people can fit in the car (i.e. the driver and four others).

In how many ways can the group of five people be selected if

- (i) both John and Mary are included
- (ii) either John or Mary is included, but not both?

Later, another one of the nine friends, Anne, gets a driving licence.

(iii) The next time the journey is made, in how many ways can the group of five be chosen, given that at least one licenced driver must be included?

6 (b) (i) Solve the difference equation $6u_{n+2} - 5u_{n+1} + u_n = 0$, where $n \geq 0$, given that

$$u_0 = 5 \text{ and } u_1 = 2.$$

(ii) Find an expression in n for the sum of the terms $u_0 + u_1 + u_2 + \dots + u_n$.
(Hint: It is the sum of two geometric series.)

(iii) Evaluate the sum to infinity of this series (that is: $\sum_{n=0}^{\infty} u_n$).

