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PHYS 247.

Problem 1 - Liner Algebra

a) show that the equation $\Omega(S,N) = \sum_{k \in \{j / A_{sj} = 1\}} \Omega(k, N-1)$ can be written in a form of matrix such that $\Omega(S,N)$ is the s^{th} element of a ~~m~~ 10x1 Matrix $\Omega(N)$ where $\Omega(N) = A \times \Omega(N-1)$

Proof

- So the matrix $\Omega(N)$ is such that s-element is $\Omega(S,N)$, i.e:

$$\Omega(N) = \begin{pmatrix} \Omega(0,N) \\ \Omega(1,N) \\ \Omega(2,N) \\ \vdots \\ \vdots \\ \Omega(9,N) \end{pmatrix}_{10x1}$$

, therefore we can write:

$$\Omega(S,N) = \Omega^N_{S} = \left[\Omega(N) \right]_{S_1}$$

(Notation)

starting from:

$$\Omega(S,N) = \sum_{k \in \{j / A_{sj} = 1\}} \Omega(k, N-1) \Rightarrow$$

$$\Omega(S,N) = \sum_{k \in \{j / A_{sj} = \}} \Omega(k, N-1) = \sum_{j=0}^{9} A_{sj} \, \Omega(j, N-1) = \sum_{j=0}^{9} A_{sj} \left[\Omega(N-1) \right]_{S_1}$$

$$= \left[A \cdot \Omega(N-1) \right]_{S_1} \Rightarrow \Omega(S,N) \text{ is the } s^{th} \text{ element of the matrix } A \cdot \Omega(N-1)$$

Q.E.D.