1a

Omega(0,N)= Omega(8,N-1)

Omega(1.N)= Omega(2,N-1)+ Omega(4,N-1)

Omega(2,N)= Omega(1,N-1)+ Omega(3,N-1)+ Omega(5,N-1)

Omega(3,N)= Omega(2,N-1)+ Omega(6,N-1)

Omega(4,N)= Omega(1,N-1)+ Omega(5,N-1)+ Omega(7,N-1)(3,

Omega(5,N)= Omega(2,N-1)+ Omega(4,N-1)+ Omega(6,N-1)+ Omega(8,N-1)

Omega(6,N)= Omega(3,N-1)+ Omega(5,N-1)+ Omega(9,N-1)

Omega(7,N)= Omega(4,N-1)+ Omega(8,N-1)

Omega(8,N)= Omega(0,N-1)+ Omega(5,N-1)+ Omega(7,N-1)+ Omega(9,N-1)

Omega(9,N)= Omega(6,N-1)+ Omega(8,N-1)

So, Omega(N)=A* Omega(N-1) while A is the 10x10 matrix

1b

For N=2, from 1a

Omega(2) = A * Omega(2-1) = A* Omega(1) = A^{2-1} Omega(1)

Assume k is true such that Omega(k) = A^{k-1} *Omgea(1)

For the (k+1) term,

Omega(k+1)= A*Omega(k+1-1)=A*Omgea(k)=A*A^{k-1} *Omgea(1) = A^{k} *Omgea(1)

By Mathematical induction, it is proved.