problems

- Problem I: Show $n^{\alpha} \nabla_{\alpha} n_{\mu} = D_{\mu} \ln \alpha$

- Problem II: derive the evolution equations of the Hamiltonian and momentum constraints

- Problem III: Derive the linear 3+1 equations for $\alpha \neq 1$ & $\beta^{k} \neq 0$

- Problem IV: Find a gauge condition which leads to $\ddot{h}_{ij} = \Delta h_{ij}$ in the linearized Einstein's equation