Excercise 1. Consider a hierarchic access network with two access nodes connected to the network via links with capacity $C = 2$. The network is Y-shaped with common link capacity $C_{\text{common}} = 2$. Both access nodes generate Poisson traffic with intensity $\rho_1 = \rho_2 = \rho$ and $\rho \in]0, 10]$, $b_1 = b_2 = 1$. Draw a figure with ρ on x-axis and end-to-end B on y-axis with curves for the exact solution, a product bound solution, and Reduced Load Approximation. Draw also a similar figure of the difference between the exact and Reduced Load Approximation.

Excercise 2. Use Kelly's approximation for implied costs in the following problem: With a hierarchic access network from the excercise 1. Both access nodes generate two classes of Poisson traffic. Traffic for the first node, $\rho_1^1 = 1$, $\rho_2^1 = 0.8$ and for the second node $\rho_1^2 = 0.4$ and $\rho_2^2 = 0.5$. The revenue per carried traffic unit is $r_1 = 1$ and $r_2 = 2$. For all traffic, $\mu^{-1} = 1$, and $b = 1$. Calculate the average revenue of different classes and $\frac{\partial}{\partial \lambda_k} W(\boldsymbol{\lambda}, \mathbf{C})$ for each λ_k and access node.