Analytical Homework 6

1. The structure shown in the figure has one degree of freedom per node. (a) Draw the skyline of the stiffness matrix and calculate the half bandwidth. (b) Suggest an improvement of the numbering scheme that will reduce the number of coefficients under the skyline.

2. Find the transformation matrix $T$ for a beam element with two degrees of freedom per node, needed to transform the stiffness matrix to a general plane coordinate system (leading to a 6x6 stiffness matrix).

3. Find the integral using Gaussian quadrature with one, two and three integration points. Compare to exact answer.

4. Integrate the function $e^{xy}$ over the square $x \in [-1,1]$ and $y \in [-1,1]$ using one an four points Gaussian quadrature. Compare to exact answer.