Helsinki University of Technology
Mat-5.156 Theory of Elasticity **Stenberg/Tuominen**
Excercise 9.

WILL BE HELD ON FRIDAY, APRIL 22, 14.15-16.00 IN ROOM 345

1. This is a continuation to excercise 8.3.

   Draw the following quantities along two adjacent sidess:

   $$M_\nu,\ M_{\nu s},\ Q_\nu,\ \ Q_\nu + \frac{\partial M_{\nu s}}{\partial s}.$$

   Check if the balance of force is valid.

2. Compute the eigenmodes of both the Euler-Bernoulli and the Timoshenko beam using your symbolic program. Try some different boundary conditions. For the Timoshenko beam you have the compute the solution for varying aspect ratios between the thickness and the length, $t/L = 0.1$, 0.05, $0.02, \ldots, 0.001$. Check how the solution converges toward the E-B solution.

3. **Home excercise. Counted as double, i.e. 6 points** Consider the clamped rectangular plate occupying the region $\Omega = (0,a) \times (0,b)$. Approximate the problem with the "p-version"of the FEM, with p=small=3,4,5,6, ... Compute

   - the solution for a point load at the center
   - the first eigenmodes.

   Use MAPLE, MATHEMATICA, ...