Text problems: 3.33 (25 pts)

Non-text problem: (75 pts) For the beam in figure 1, and data in table 1, perform the following tasks:

![Figure 1: Beam for non-text problem](image)

<table>
<thead>
<tr>
<th>$P_1$</th>
<th>$P_2$</th>
<th>$L$</th>
<th>$b$</th>
<th>$h$</th>
</tr>
</thead>
<tbody>
<tr>
<td>110 kN</td>
<td>25 kN</td>
<td>30 cm</td>
<td>1 cm</td>
<td>1 cm</td>
</tr>
</tbody>
</table>

Table 1: Data for non-text problem

1. Draw Mohr’s circle at the top of the beam at the support. What are the values of $\sigma_{p_{1,2}}$, $\theta_{p_{1,2}}$, $\tau_{\text{max}}$ and $\theta_s$ at the top surface?

2. Draw Mohr’s circle half way between the neutral axis and the top of the beam at the support. What are the values of $\sigma_{p_{1,2}}$, $\theta_{p_{1,2}}$, $\tau_{\text{max}}$ and $\theta_s$ here?

3. Plot the distribution of $\sigma_{p_{1,2}}$ and $\tau_{\text{max}}$ over the height of the beam. Do this at the cross-section where the fixed support is located. This needs to be done on a computer, not by hand.

4. What are the maximum absolute values of normal and shear stress at the support, taking into account the entire height and all orientations (you can estimate from your plot)? At what heights do they occur?

5. Repeat items 3 and 4 for $h = 4$ cm.