# Homework 5 - Elasticity Problem

Handed out: Tue., 13-10-2007   **Due to: Thurs., 22-11-2007**

1. Consider the "one-dimensional" thermoelastic problem of a uniform bar constrained in the x direction (allowed to expand freely in the other two directions) depicted in the figure bellow. Compute the stress and strain fields when the body is submitted to a difference of temperature ΔT in its surround environment.
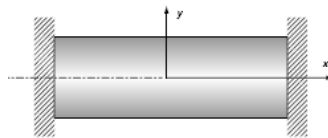
2. Formally describe the boundary conditions for the following situations
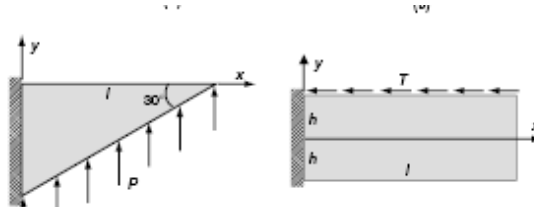
3. A semi-infinite solid loaded by a concentrated normal force acting on its free surface is subjected to the stress field described bellow. How can you check if this solution is correct?

$$\sigma_x = -\frac{2PX^2Y}{\pi(X^2 + Y^2)^2}$$

$$\sigma_y = -\frac{2PY^3}{\pi(X^2 + Y^2)^2}$$

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$$\sigma_{xy} = -\frac{2PXY^2}{\pi(X^2 + Y^2)^2}$$

Combining the superposition method with the above expressions, find a solution to the problem containing two concentrated forces, as depicted in the figure bellow. Discuss the final results with respect to the Saint-Venant Principle.