## Homework 7

*(Due Dec 2, in class)*

1. A metallic cube of original edge length a is dropped into the sea. Assume isotropic linear elasticity for the cube, i.e. E and v are given. Assume gravity g. Density of the seawater is ρ. Find the change in the volume of the cube at depth h from the surface.   [6 points]

2. Consider a prismatic block with known elastic constants E_p and v, with square cross-section of edge length a and height l. This block is sandwiched between two rigid and smooth plates, held together by four cables of individual cross-section area A_c and elastic constants E_c and v, as shown in the figure below. A compressive pressure p is applied on two opposite sides of the block.

a) Reference configuration

b) current configuration
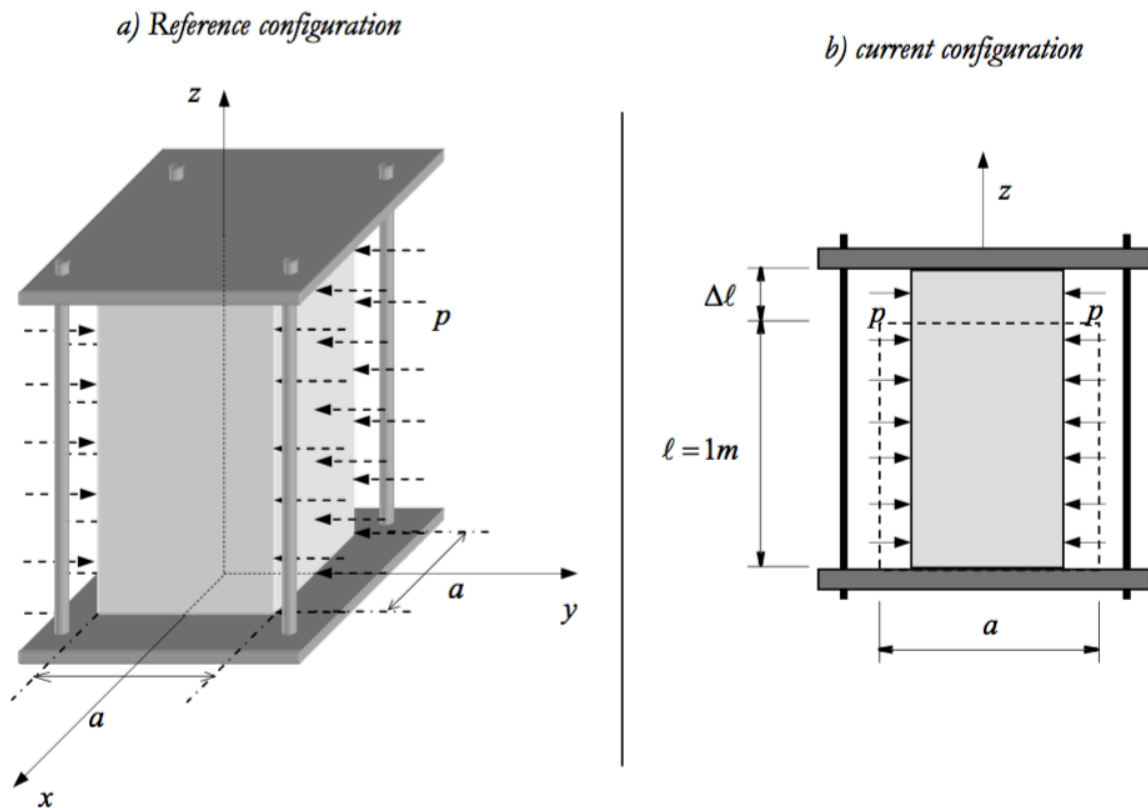
i.	Find the stress σ_c on the cables.	[6 points]
ii.	Find the stress field in the block.	[3 points]
iii.	Find the change in volume experienced by the block.	[3 points]

3. Two blocks of the same material (known E and v) and the same shape $a \times b \times c$ are separated by a rigid and smooth plate, in contact with the sides $a \times c$ of the blocks. Both blocks, along with the attached plate in the middle, are introduced into a cavity as indicated in the figure below. The walls of the cavity are flat, rigid, and smooth. Two different pressures p_2 and p_1 are applied on the upper faces of the blocks, the sides $b \times c$.
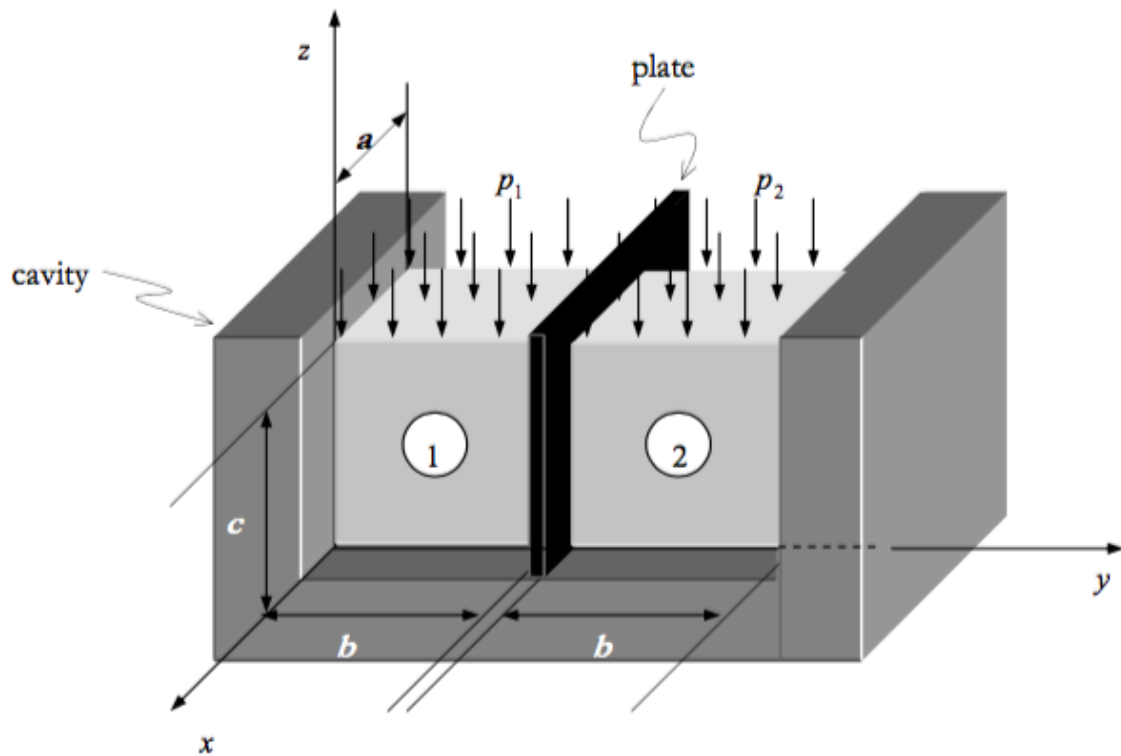
i.	Find stress fields in both blocks.	[7 points]
ii.	Find the changes in the edge lengths of both blocks.	[5 points]