

## 459.731 Theory of Poroelasticity

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### Assignment #5 (5 April)

due by 12 April 2010

1. Show that  $E=G(3\lambda+2G)/(\lambda+G)$ ,  $\nu=\lambda/2/(\lambda+G)$ ,  $E=9KG/(3K+G)$  and  $\nu=(3K-2G)/(6K+2G)$ . Definitions of each parameters were given during the class.

2. Assuming that a rock element is subjected to  $\sigma_v = \sigma_H$  at a depth of 2400 m and erosion causes a removal of 1200 m of overburden over millions of years, determine the stress state at a depth of 1200m and ratio of horizontal to vertical stress after erosion. The density and Poisson's ratio of rock is 2600 kg/m<sup>3</sup> and 0.25, respectively. You are not encouraged to use existing formula and note that the answer to this question is largely open. Make your own assumptions, if necessary.