Homework #3

Problem 1:

Using the oblique system of coordinates (x'^1, x'^2) discussed in class show that if Φ is an scalar function of the position vector **r** which means that $\Phi(x'_1, x'_2)$=$\Phi(x'^1, x'^2)$=$\Phi(x_1, x_2)$, where (x'_1, x'_2) and (x'^1, x'^2) are the covariant and contravariant components of **r** in the oblique system and (x_1, x_2) are the components of **r** in a cartesian system:

a) $B'_i = \frac{\partial\Phi}{\partial x'^i} = \partial'_i\Phi$ is a covariant vector.

b) $B'^i = \frac{\partial\Phi}{\partial x'_i} = \partial'^i\Phi$ is a contravariant vector.