Math 335-002
Homework #6
Due date: February 13.

1. Find the Laplacian of the vector field $\vec{V}(\vec{r}) = (x^2 + z^2, \cos x + x^2 e^y, \sin(x z))$.
    Remember that the Laplacian of a vector field is a vector field.

2. Re-write the right-hand side of the equation $\nabla^2 \vec{u} = \vec{\nabla}(\vec{\nabla} \cdot \vec{u}) - \vec{\nabla} \times (\vec{\nabla} \times \vec{u})$ using
    symbols *div*, *grad* and *curl*. Verify that this equation is satisfied for the vector field
    $\mathbf{u} = (y^2 + x^2, x^2 + z^2, z^2)$.

3. Translate the following suffix notation equation into vector notation:

    $$a_j b_j c_i + u_i = u_k b_i u_k$$

4. Simplify and convert into vector form (eliminate Kronecker deltas one at a time – see
    Eq. 4.3 on page 68, which defines the identity matrix):

    $$\delta_{kl} a_l \delta_{mj} a_k b_m$$