PHYS3122A Homework 2, due Friday 09/04/2009 at 5pm

1) Solve problems: 1.32, 1.33, 1.36, 1.37, 1.39, 1.44, 1.46, 1.48, 1.49a
2) Derive the expression of gradient of a scalar field in cylindrical coordinates:

$$\vec{\nabla} f(r, \varphi, z) = \frac{\partial f}{\partial r}\hat{r} + \frac{1}{r}\frac{\partial f}{\partial \varphi}\hat{\varphi} + \frac{\partial f}{\partial z}\hat{z}$$

3) Using simple counter examples to show that vector multiplications are not associative:

$$\left(\vec{A} \cdot \vec{B}\right) \cdot \vec{C} \neq \vec{A} \cdot (\vec{B} \cdot \vec{C}) \quad \text{and} \quad \left(\vec{A} \times \vec{B}\right) \times \vec{C} \neq \vec{A} \times (\vec{B} \times \vec{C})$$