MEEG 4703 Quiz #2

1. (10 pts) Using index notation, prove the identity:
$$\nabla^2 \mathbf{P} + \nabla \times (\nabla \times \mathbf{P}) = \nabla(\nabla \cdot \mathbf{P})$$

2. (10 pts) Using index notation, prove the identity:
$$(\mathbf{P} \cdot \mathbf{Q} \times \mathbf{R})^2 = (\mathbf{P} \times \mathbf{Q}) \cdot (\mathbf{Q} \times \mathbf{R}) \times (\mathbf{R} \times \mathbf{P})$$

3. (10 pts) Using index notation, prove the identity:
$$\nabla \times (\mathbf{P} \times \mathbf{Q}) + (\mathbf{P} \cdot \nabla)\mathbf{Q} + (\nabla \cdot \mathbf{P})\mathbf{Q}$$
$$= (\mathbf{Q} \cdot \nabla)\mathbf{P} + (\nabla \cdot \mathbf{Q})\mathbf{P}$$