

Short Exam 1

Name: _____

Physics 403: Mathematical Methods

February 1, 2008

Complete this quiz showing all work.

1. Compute divergence of

$$\vec{A} = r^2 \tan \phi \hat{r} - r \sin \theta \hat{\theta} + \sin \theta \cos^2 \phi \hat{\phi}.$$

2. Compute the curl of

$$\vec{A} = (2x + x^2z) \hat{x} + (3 - 2xyz^3) \hat{y} + (xz^2 - y) \hat{z}.$$

3. Show by explicitly computing it that $\nabla \cdot \nabla \times \vec{A} = 0$ for \vec{A} above.