PHY2333 DGD problems for Monday/Wednesday January 18/20, 2016

From textbook: Problems 2.24, 2.44, 2.42, 2.43; Exercise 3.1

Assignment 1 due Friday January 22, 2016

A. For the vector function $\vec{A} = \rho^2 \hat{a}_\rho + 2z\hat{a}_z$, verify the divergence theorem for the cylindrical region enclosed by $\rho = 5$, $z = 0$, and $z = 4$.

B. A vector field $\vec{D} = (\cos^2 \phi) r^{-3} \hat{a}_r$ exists in the region between the two spherical shells defined by $r = 2$ and $r = 3$. Evaluate explicitly a) $\oint \vec{D} \cdot d\vec{s}$ b) $\int \nabla \cdot \vec{D} \; dv$