**Homework 04**

Instructions:

Each problem should begin at the top of a new sheet of paper. (OK to use front and back if you want). The final answer (numerical or symbolic) should be copied into a box (or written in a different color) at the top right of your page. (For proofs, this isn't reasonable, so don't do it.) Each problem should have your name on the left and, below it, the *SPN*, circled. Problems should (usually) include a 3x3 inch sketch and begin with the general equations and the assumptions you make. For numerical answers, show numbers plugged into the equation before solving with a calculator. Numerical answers should include SI units.

SPN 4–01. Point charges $q_1 = 3.0 \ \mu C$, $q_2 = 4.0 \ \mu C$, and $q_3 = -7.0 \ \mu C$ are located at $\vec{r}_1 = 0\hat{\mathbf{x}} + 0\hat{\mathbf{y}}$ m, $\vec{r}_2 = 0.2\hat{\mathbf{x}} + 0.3\hat{\mathbf{y}}$ m, $\vec{r}_3 = 0.5\hat{\mathbf{x}} + 0.5\hat{\mathbf{z}}$ m. Find $\vec{E}$ at $\vec{r}_T = 0.5\hat{\mathbf{x}} - 0.2\hat{\mathbf{z}}$ meters.

SPN 4–02. (*– test the divergence theorem*)
A cube of side length L has one vertex at the origin. Imagine a vector field $\vec{F}$ such that $\vec{F} = xyz(\hat{x} + \hat{y} + \hat{z})$. Show that the divergence theorem (Equation 1.56) works for this vector field.

SPN 4–03. Do Problem 1.56. (*– test Stoke's theorem*)
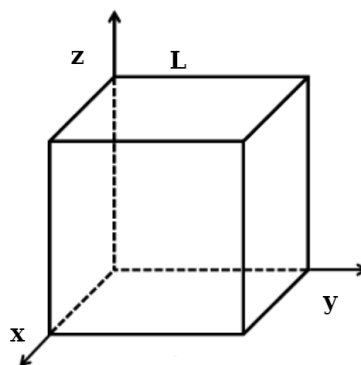
Problem 2: A cube of side length L with one corner at the origin.