1. P1.9
2. P1.19
3. P1.21
4. A hemispherical body of radius $R$ is centered on the origin with its base lying in the $x - y$ plane and the surface in the region $z > 0$. Calculate the flux

$$\Phi \equiv \int_{\text{hemisphere}} d\vec{a} \cdot \vec{U}$$

through the hemispherical surface of the vector field (function) $\vec{U} \equiv \hat{z} C z^2 / R^2$ where $C$ is a constant. (The $d\vec{a}$ is directed away from the origin as usual.)

5. P2.1
6. A thin rod extends along the $z$ axis from $z = -a$ to $z = a$, carrying a uniform charge density $\lambda$.
   a) Calculate the potential at all points along the positive $x$ axis.
   b) Calculate the electric field at all points in the $x - y$ plane.