10. **Griffiths, p. 144, Prob. 3.18. Recall** That, **In Spherical Coordinates,** (r,θ,ϕ), **With Imposed Azimuthal Symmetry,** $\partial V/\partial\phi = 0$, the **Laplace Equation For** the **Electrostatic Potential,** $\frac{\partial}{\partial r}\left(r^2\frac{\partial V}{\partial r}\right)+\frac{1}{\sin\theta}\frac{\partial}{\partial\theta}\left(\sin\theta\frac{\partial V}{\partial\theta}\right)=0$, **Can Be Solved Using** a **Separation Of Variables,** $V(r,\theta)=R(r)\Theta(\theta)$, **Where the General Solution** Can Be Written As An Infinite Sum Of Radial Power Law Functions In Combination With Polar Angle Legendre Polynomials, Which **Is** $V(r,\theta)=\sum_{l=0}^{\infty}\left(A_l r^l + B_l r^{-(l+1)}\right)P_l(\cos\theta)$, And **Where** the **Coefficients,** A_l, B_l, **Can Be Projected Out, Using** the **Orthonormality Relation** For the Legendre Polynomials, Where $\frac{2l+1}{2}\int_0^{\pi}P_l(\cos\theta)P_{l'}(\cos\theta)\sin\theta d\theta=\delta_{l,l'}$. **First, Due To** the **Infinite Radius Boundary Condition,** $r\to\infty$, **Where** $V\to 0$, You Should **Simplify** the **General Infinite Sum Solution** For the Electrostatic Potential, $V(r,\theta)$, **Outside Of** the **Sphere,** For $r>R$. **Next,** It Will Be Very Important To **Show That** the **Surface Potential,** $V(R,\theta)=V_0=k\cos 3\theta$, **Can Be Expressed As** $V_0=k\left(4\cos^3\theta-3\cos\theta\right)$, Where You Could Use the Complex Exponential Representation Of the Cosine Functions, $\cos(n\theta)=\left(e^{in\theta}+e^{-in\theta}\right)/2$, And Show That Each Representation Of the