1. Problem 2.42 (text).
2. Problem 2.44 (text).
3. Problem 2.47 (text).
4. A point charge of 5 nC is located at the origin. If \( V = 2 \) V at \((0, 6, -8)\), find the potential at \( A(-3, 2, 6) \), at \( B(1, 5, 7) \), and the potential difference \( V_{AB} \).
5. Given that the electric field in a certain region is \( \vec{E} = (z + 1)\sin\phi \hat{\rho} + (z + 1)\cos\phi \hat{\phi} + \rho \sin\phi \hat{z} \) V/m, determine the work done in moving a 4-nC charge from
(a) \( A(1, 0, 0) \) to \( B(4, 0, 0) \)
(b) \( B(4, 0, 0) \) to \( C(4, 30^\circ, 0) \)
(c) \( C(4, 30^\circ, 0) \) to \( D(4, 30^\circ, -2) \)
(d) \( A \) to \( D \)
6. Determine the curl of the vector fields below and evaluate them at the specified points.
   (a) \( \vec{A} = yz\hat{x} + 4xy\hat{y} + y\hat{z} \) at \((1, -2, 3)\)
   (b) \( \vec{B} = \rho z\sin\phi \hat{\rho} + 3\rho z^2\cos\phi \hat{\phi} \) at \((5, \pi/2, 1)\)
   (c) \( \vec{H} = 2r\cos\theta\cos\phi \hat{r} + \sqrt{r}\hat{\phi} \) at \((1, \pi/6, \pi/3)\)
7. To verify that \( \vec{E} = yz\hat{x} + xz\hat{y} + xy\hat{z} \) V/m is truly an electric field, show that
   (a) \( \nabla \times \vec{E} = 0 \)
   (b) \( \oint_L \vec{E} \cdot d\vec{l} = 0 \), where \( L \) is the edge of the square defined by \( 0 < x, y < 2, z = 1 \).

Reading Assignment: Chapter 3