1. [2 points] First, more on delta functions:
   (a) Describe in words or with a sketch the nature of the charge distribution
   \[ \rho(r) = q_0 \delta^3(r - \frac{L}{2} \hat{x}) + q_0 \delta^3(r + \frac{L}{2} \hat{x}) - q_0 \delta^3(r - \frac{L}{2} \hat{y}) - q_0 \delta^3(r + \frac{L}{2} \hat{y}) \]
   What is the total charge contained in this charge distribution?
   (b) Same for the charge distribution \( \rho(r) = \rho(s, \phi, z) = A \delta(z - z_0) \delta(s - R) \).

2. [4 points] Griffiths 2.24 (coax cable revisited). You may use the results of previously assigned Problem 2.16 from HW Set 3.

3. [2 points] Griffiths 2.29 (check Eq. 2.29).

4. [4 points] This is essentially part (b) of 2.25:
   (a) Use Eq. (2.29) [in the form of the first of the equations in (2.30)] to find the potential at point P a distance \( z \) above the center of the line-segment charge distribution of Fig. 2.34(b).
   (b) Then compute \( \mathbf{E} = -\nabla V \), and compare your answer with the result of Example 2.2.

5. [4 points] (a) Using Eq. (2.29), find the potential \( V \) at the exact center of a sphere of radius \( R \) with a uniform charge density \( \rho_0 \) in its interior.
   (b) Conclude from this: How much work must you do to move a charge \( Q \) from infinity to the center of the sphere?

6. [4 points] Griffiths 2.31 (assembling point charges).