1. It is impossible for a spherically symmetric distribution of charge oscillating radially to radiate. Prove this by the following method. Take the current to be
\[ J(r', t_R) = r' f(r') e^{-i\omega t_R} \]
where \( f \) is a function only of \( r' \) and \( t_R \) is the retarded time. Choose an observation point along the \( z \)-axis to calculate \( A \) and the corresponding electromagnetic fields.

2. A charge \( q \) has uniform motion in a circle of radius \( a \) plane with an angular frequency \( \omega \). Using the electric dipole approximation, (a) Find the fields \( E \) and \( H \) in the radiation zone, and (b) Find the angular distribution of the radiated power. (c) Is there magnetic dipole radiation? Why or why not? (d) Is there electric quadrupole radiation? Why or why not?

3. Two identical charges \( q \) separated by a distance \( d \) are rotating in the \( x \)-\( y \) plane with an angular frequency \( \omega \). (a) Find the electric dipole radiation fields \( E \) and \( H \), and (b) Find the angular distribution of the radiated power. (c) Calculate the magnetic dipole moment and the corresponding angular distribution of radiated power. (d) Calculate the electric quadrupole moment and the corresponding angular distribution of radiated power.