Problem 1.

Point charge $q$ is positioned distances $a'$ and $b'$ from an angle created by two semi-infinite metal planes. Find the force acting on the point charge. (Use vector notations) (3 points)

Problem 2.

A long coaxial cable of length $L$ consists of two metal cylinders of radii $R_1$ and $R_2$.

1) Find the capacitance of the cable.

2) What condition should be satisfied for the length $L$ for your result to be a good approximation? (3 points)

Problem 3.

Infinite metal cylinder of radius $R$ is placed in a homogeneous external field $E_0$.

1) Find electric potential everywhere in space (use separation of variables in the cylindrical coordinates)
b) Find surface charge density everywhere on a cylinder.

c) Where on the surface is the electric field the strongest? the weakest?

(4 points)