Phys 3320 Electricity and Magnetism I
Fall 2018
Assignment 4

1. Find the potential at a point $\mathbf{r} = z\mathbf{k}$ for a square sheet of charge with a uniform density σ_o and which lies between x=-a and a, and y=-a to a.

2. An inverted hemispherical bowl has a radius R and $z \geq 0$. It carries a uniform charge density σ_o. Find the potential difference between the centre (the origin) and the "north pole" (z=R).

3. A quadrupole is effectively two dipoles back-to-back. There is a positive charge Q at the point z=a, and an equal one at the point z=-a, and a charge of -2Q at the origin. Starting with the Coulombic formula write down the potential at the point **r**, and use the Binomial Theorem to simplify the result assuming $r \gg a$. Hint: use Maple to help find the series expressions for each of the denominators.