6. [10 points] A thin circular plate of radius 3 m is being used to launch an electric rocket into space. The charge density, in Coulombs per m^2, on the surface of the plate a distance r meters from its center is given by a function $\delta(r) = 1 - kr$ for some constant k. Note that a Coulomb is a unit of electric charge.

a. [4 points] Write an expression involving integrals for the total charge, in Coulombs, on the surface of the circular plate. Do not evaluate the integral(s).

b. [6 points] Find the value of k if the total charge on the surface of the plate is 3π Coulombs. Be sure to show all your work including algebra and any evaluation of integrals.