Special Problem 3-4.2

Current is flowing in a region with density:

\[
J(\vec{r}) = \frac{r}{8\pi} \hat{a}_r + r \cos\phi \hat{a}_\rho + \cos\theta \sin\phi \hat{a}_\phi \quad [\text{A/m}^2]
\]

A sphere with radius 2 meters, centered at the origin, encloses at one moment in time a charge of 5 Colombs.

How much charge is enclosed by this sphere one second later?