You know the drill!

1. What is the metric for the interior solution of an infinite body of vacuum energy? That is, the energy-momentum tensor is simply proportional to the metric, i.e. $T_{\mu\nu} = kg_{\mu\nu}$.

\[
G_{\mu\nu} + \Lambda g_{\mu\nu} = 0 \implies G_{\mu\nu} = 8\pi G (\frac{-\Lambda}{8\pi G} g_{\mu\nu})
\]

so the solution to the equation $G_{\mu\nu} = 8\pi G \Lambda g_{\mu\nu}$ is the same as $G_{\mu\nu} + \Lambda g_{\mu\nu} = 0 \implies k = -\frac{\Lambda}{8\pi G}$

\[
ds^2 = -\left(1 - \frac{2\Lambda}{r} + \frac{8\pi G k r^2}{3}\right)dt^2 + \left(1 - \frac{2\Lambda}{r} + \frac{8\pi G k r^2}{3}\right)^{-1} dr^2 + r^2 d\Omega^2
\]

but since we do not have a source other than $\Lambda$, we need to take $\Lambda \to 0$, hence

\[
ds^2 = -\left(1 + \frac{8\pi G k r^2}{3}\right)dt^2 + \left(1 + \frac{8\pi G k r^2}{3}\right)^{-1} dr^2 + r^2 d\Omega^2
\]
2. For which of $\Lambda = +, -, 0$ is it possible to place an object at rest a certain finite distance from the center of a spherically symmetric source and have it remain at rest? What is going on?

Recall that for $L=0$ we have $U_{\text{eff}}(r) = \frac{1}{2} - \frac{1}{r} - \frac{\Lambda r^4}{6}$

What's going on is that gravity, for a localized source, is attractive, but gravity from a negative vacuum source is repulsive and so when both are present they can balance each other out.