Consider a superposition of nonlifting flow over a cylinder and a vortex located at the center of the cylinder:

\[
\psi = \left(V_o r \sin \theta \left(1 - \frac{R^2}{r^2}\right) + \frac{\Gamma}{2\pi} \ln \frac{r}{R}\right) \quad \text{(Note: } R \text{ is the radius of the cylinder)}
\]

(a) For the case of \( r = R \) (surface of the cylinder), determine the equation of stagnation streamline. Let \( \Gamma = 3\pi V_o R \) \( (\Gamma < 4\pi V_o R) \).
   Sketch streamlines of flow field (including the stagnation streamline).
(b) For the case of \( r = R \) (surface of the cylinder), determine the equation of stagnation streamline. Let \( \Gamma = 4\pi V_o R \). Sketch streamlines of flow field (including the stagnation streamline).

**Hints . . .**
- Work review problems, first.
- Substitute stagnation point(s) into streamfunction, in order to determine the equation of stagnation streamline.