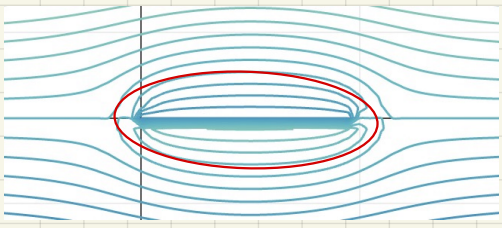
Lance Tan
Homework 3

Oval:

→ combine a source and a sink w/ uniform flow

→ stream function:

$$\psi(x,y) = 5y + \frac{20}{2\pi}\tan^{-1}\left(\frac{y}{x}\right) - \frac{20}{2\pi}\tan^{-1}\left(\frac{y}{x-5}\right)$$

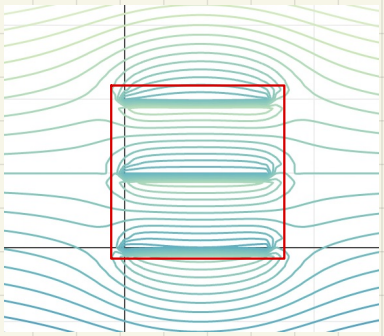


Square:

→ vertically stack orals w/ uniform flow

→ stream function:

$$\psi(x,y) = 5y + \frac{20}{2\pi}\left[\tan^{-1}\left(\frac{y}{x}\right) + \tan^{-1}\left(\frac{y-2}{x}\right) + \tan^{-1}\left(\frac{y-4}{x}\right) - \tan^{-1}\left(\frac{y}{x-4}\right) - \tan^{-1}\left(\frac{y-2}{x-4}\right) - \tan^{-1}\left(\frac{y-4}{x-4}\right)\right]$$



Triangle:

→ combine 3 sources w/ uniform flow

→ stream function:

$$\psi(x,y) = 5y + \frac{20}{2\pi}\tan^{-1}\left(\frac{y}{x}\right) + \frac{20}{2\pi}\tan^{-1}\left(\frac{y-2}{x-4}\right) + \frac{20}{2\pi}\tan^{-1}\left(\frac{y+2}{x-4}\right)$$