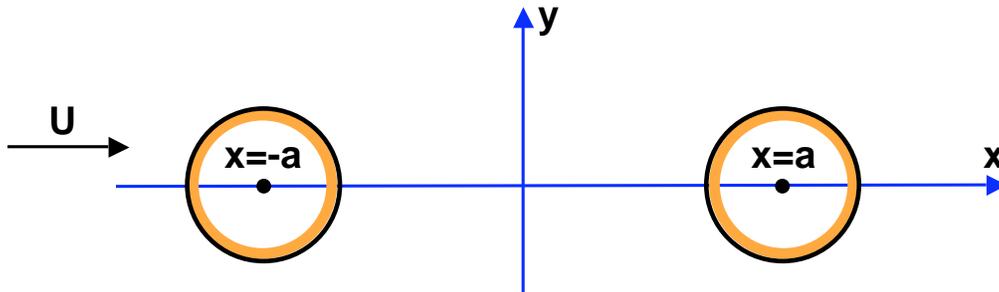


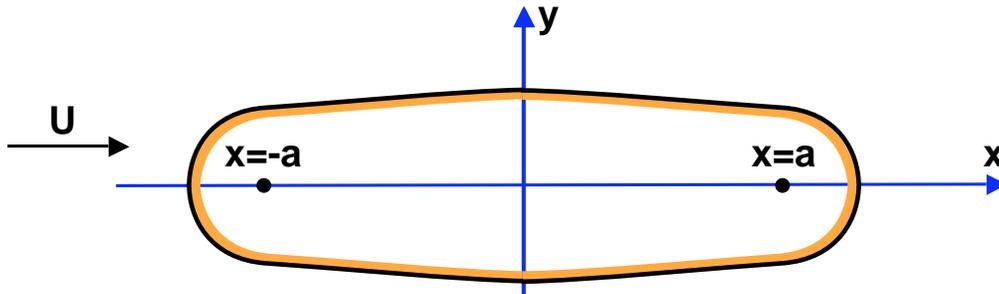
**Problem 120K**

This question is concerned with planar, incompressible, inviscid potential flow. The velocity potential,  $\phi$ , and streamfunction,  $\psi$ , for a planar doublet oriented in the  $x$ -direction and located at the origin of an  $x, y$  coordinate system are given by  $\phi = Bx/(x^2 + y^2)$  and  $\psi = -By/(x^2 + y^2)$  where  $B$  is the strength of the doublet.

The flow of a uniform stream (velocity,  $U$ ) in the  $x$  direction around an elongated body is to be constructed by placing a planar doublet at  $x = a, y = 0$  and another one at  $x = -a, y = 0$ . They both have the same orientation and strength,  $B$ . For small values of  $B$  below some critical value the result is the flow around two bodies:



For values of  $B$  larger than the critical value the result is the flow around a single body:



Determine the critical value of  $B$ . Hint: at the critical value the two bodies touch at the origin.