1. Problem 2 page 396 of text. The R is as defined in problem 1 on this page, and as discussed in class.

2. Problem 1, page 403 of text.

3.Problem 3, page 403. (Set $x_1 = -1, x_2 = -a$ etc.)

4.Problem 4, page 403.

5. Problem 5, page 404

6. (a) Based on the discussion in class, show that the mapping shown in the figure is given by

$$w = A' \int_0^z \frac{s^{2\alpha/\pi}}{(1-s^2)^{\alpha/\pi}} ds + ai$$

where

$$A' = \frac{2(b-ai)}{B(\alpha/\pi + 1/2, 1-\alpha/\pi)}.$$

Here $B(p,q) = \int_0^1 t^{p-1}(1-t)^{q-1} dt$.

(b) Determine the mapping function in the limit $b \to 0$, $a > 0$ fixed.

(c) Use the result of (b) to find the complex potential $\phi + i\psi = W(w)$ for the uniform flow past a rigid fence $u = 0, 0 \le v \le a$ in the w-plane, such that the velocity at $w = \infty$ is (U,0). Note that here the w-plane is now the physical plane. Consider the image of the complex potential $W = Uaz$ in the z-plane. (Unfortunately the notation now involves w and W with different meanings. You might prefer to rename the w -lane as the ζ-plane for part (c), and restrict w to complex potential.) You do not have to give ϕ, ψ explicitly as functions of u, v.