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.)


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 $u = 0, 0 \leq v \leq a$ 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 $\zeta$-plane for part (c), and restrict $w$ to complex potential.) You do not have to give $\phi, \psi$ explicitly as functions of $u, v$. 

\[\text{Diagram:}\]

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A  B  C  D  E
-1  +1

W  ia

A' B' C' D' E'
-b  +b
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