MATH 502, Spring '97 Homework 5 Arnold

§IV.7: 4

§V.1: 1 (a)–(e), 3, 7, 8, 9, 16, 17

(The next two problems are from the summer '94 qualifying exam.)

1. Show that if $0 < r < R$ then there exists and $\epsilon > 0$ such that

$$\sup\{|p(z) - z^{-1}| : r < |z| < R\} > \epsilon,$$

for every polynomial $p(z)$.

2. Let $a > 1$. Evaluate $\displaystyle\int_0^{2\pi} \frac{d\theta}{a + \sin\theta}$.

Residue calculations take practice, so I recommend exercises 1–10 in §V.2 (but you don't have to hand them in).