

ECE 6382

Midterm Exam

Oct. 28, 2005

1. Show that $\sinh z$ is an analytic function in the entire finite complex plane $z = x + iy$. Hint: See identities in Arfken and Weber, prob. 6.1.11., p. 411.

2. Consider the function

$$f(z) = \frac{1}{z(z-2)}.$$

- a.) Determine the residues of the function.

- b.) Develop a Laurent series expansion valid for $|z-2| < 2$.

3. Evaluate the integral $\int_{-\infty}^{\infty} \frac{dx}{(x-1)(x^2+4)}$ by contour integration.

4. Evaluate the integral $\int_0^{2\pi} \frac{\sin^2 \theta}{1 + \frac{4}{5} \cos \theta} d\theta$ by contour integration.