Math 3160 **Applied Complex Variables** **Spring 2008**

NAME:.....

MidTerm3 **April 17, 2008.**

1. Evaluate the following integral (using residues)

$$\int_{-\infty}^{+\infty} \frac{\sin x \; dx}{x^2 + 4x + 5} \; .$$

2. Evaluate the following integral (using residues)

$$\int_0^{2\pi} \frac{d\theta}{1 + a\cos\theta}$$

(where a is a parameter, $-1 < a < 1$)

3. Find the image of the semi-infinite strip $x > 0$, $0 < y < 2$ under the transfoirmation $w = iz + 1$ ($z = x + iy$, $w = u + iv$). Sketch the strip and its image.

4. Find the image of the infinite strip $0 < y < 1/(2c)$ under the transfoirmation $w = 1/z$ ($z = x+iy,\ w = u+iv$). Sketch the strip and its image.

5. Find the linear fractional transformation that maps points $z_1 = \infty,\ z_2 = i,\ z_3 = 0$ into points $w_1 = 0,\ w_2 = i,\ w_3 = \infty$ (respectively). Into what curve the line $x = 1$ is transformed? Sketch the line and its image ($z = x + iy,\ w = u + iv$).