MAT 342 Spring 2010
Review of Midterm 1 Material

Sections 1-10. Make sure you understand the basic arithmetic of complex numbers: addition, subtraction, multiplication, division, conjugates, moduli, exponential form, roots. Also absolute value and argument, including Arg (p.16). Be comfortable with the triangle inequality $|z_1 + z_2| \leq |z_1| + |z_2|$. Know Euler's formula $e^{i\theta} = \cos(\theta) + i\sin(theta)$ and how to use it to convert back and forth between $z = x + iy$ and $z = re^{i\theta}$. Examples 1, 2 p.17.

Section 11. Remember that in this book, *ϵ-neighborhood of z_0* means the set $\{z \mid |z - z_0| < \epsilon\}$. Here ϵ is a positive, real number. Understand the meaning of "open," "boundary," "closed," "connected" and "accumulation point."

Section 12. For $w = f(z)$ a complex function, writing $w = u + iv$ and $z = x + iy$, understand how to write $f(z)$ in terms of the two real-valued functions of two variables, $u(x, y)$ and $v(x, y)$. This gives $f(z) = u(x, y) + iv(x, y)$. Understand the concept of *multiple-valued-function.* This is *not* a function!

Sections 13-14. Given $w = f(z)$, know how to sketch images in the w-plane of regions in the z-plane. Sect. 13, Examples 1, 2, 3 are typical. Also Section 14, Example 2.