MATH 302 -01 (Term 061)

Major Exam III

Thursday 7 December, 2006

Time Allowed: 60 minutes

Instructor: Dr. A. Boucherif

Name:..........................................................ID #............................

Serial #:............

• Write clearly.
• Show all your steps.
• No credit will be given to wrong steps.
• Do not do messy work
• Calculators are not allowed in this exam.

Mark: ________

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Q1. Find the locus (i.e. the set of all $z$) represented by

(a) $|z - 2| = 3; \quad$ (b) $|z - 1| = |z + 4|; \quad$ (c) $|z - 3| + |z + 3| = 10.$
Q2. Determine the region in the complex plane represented by each of the following

(a) \(|z - 1| < |z - 2|\); (b) \(1 < |z + 2i| < 2\)
Q3. Find the real part and the imaginary part of the following functions

(i) \( f(z) = \frac{1}{1 - z} \);  \hspace{1cm} (ii) \( f(z) = \ln z \)
Q4. Prove that $f(z) = z |z|$ is not differentiable anywhere.
Q5. Let $f$ be a differentiable function such that $\text{Im } f(z) = 2x(1 - y)$.
Find $\text{Re } f(z)$ and $f(z)$. 