University of Toronto at Scarborough
Department of Computer & Mathematical Sciences

TEST 1

MATC34H – Complex Variables

Examiner: J. Friedlander   Date: October 21, 2008

1. [**6 marks**] Write each of the following in the form $a + bi$ with a, b real.

   (a) $(1 + 2i)(\overline{3 - i})^{-1}$

   (b) i^{1+i}

2. [**7 marks**] Without evaluating it, give an upper level bound for the modulus of the integral
$$\int_\gamma \frac{\sin z}{z^2 + 1}\, dz$$
   where γ is the circle $|z| = 2$.

3. [**7 marks**] Prove that if $f(z) = u(z) + iv(z)$ is differentiable in a domain then it satisfies the Cauchy–Riemann equations there.