KFUPM   **Semester 122**

Dept. Math. &Stat.   **A.Y:2012/2013**

Name: ....

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Exercise 1. Let f be the complex function defined by $f(z) = \dfrac{\overline{z}^2}{z}$ when $z \neq 0$ and $f(0) = 0$.

    a. Show that Cauchy-Riemann equations are satisfied for f only at the origin 0.

    b. Is f differentiable at 0?

Exercise 2. Show that the function $u(x, y) = 2x(1-y)$ is harmonic and find a harmonic conjugate v of u.

Exercise 3. Evaluate $\mathrm{Ln}(i^3)$. Is $\mathrm{Ln}(i^3) = 3\mathrm{Ln}(i)$?

Exercise 4. Find all complex numbers z such that $\sin(z) = 5$.