DEPARTMENT OF MATHEMATICS
MTL 122: Real and Complex Analysis
Quiz - 2   *Marks - 10*

All questions are compulsory. Assume everything done in class.

(1.) Let

$$g(z) = \begin{cases} \frac{|z|^4}{z^2}, & z \neq 0; \\ 0, & z = 0. \end{cases}$$

Find all $z \in \mathbb{C}$ for which $g(z)$ is differentiable.   [3 Marks]

(2.) The real part of an analytic function is
$$e^{y^2 - x^2} \cos 2xy.$$
Find its complex conjugate.   [3 Marks]

(3.) Let $g(z)$ be a non vanishing analytic function on $\overline{D}$, where D is a simply connected domain with ∂D being simple closed curve and

$$f(z) = (z-a)^n g(z)$$

where $a \in D^\circ$, $n \in \mathbb{Z}$. Evaluate $\frac{1}{2\pi i} \int_{\partial D} \frac{f'(z)}{f(z)} dz$.   [4 marks]