

中國文化大學 九十四 學年度 第二學期 期末 考試試卷					
考試科目	任課老師	系級	考試日期	份數	備註
高等工程數學	陳為仁	機三 B	95/06/06	70	closed books

- Given a complex number $z = 3 + 3i$. (1) Find $\arg(z)$ of the complex number z , and (2) the polar form of this complex number. (10)
- Use the definition $f'(z) = \lim_{\Delta z \rightarrow 0} \frac{f(z + \Delta z) - f(z)}{\Delta z}$ to obtain the derivative of the given complex function $f(z) = z^2$. (10)
- Given a complex function $f(z) = z - i$. (10)
 - Find $u(x, y)$ and $v(x, y)$ such that $f(z) = u(x, y) + iv(x, y)$.
 - Show that $f(z)$ is analytic for the entire complex plane.
- Evaluate the complex line integral $\int_C \operatorname{Re}(z) dz$ where the contour C is the line segment from 1 to $2 + i$. (10)
- Evaluate the complex line integral $\oint_C \frac{z^2 + 1}{z^2 - 1} dz$ if the closed path C is the circle $|z| = 3$. (10)
- Expand the complex function $f(z) = \frac{2i}{4 + iz}$ in Taylor's series with center $z_0 = 2i$ and find the radius of convergence of the Taylor's series. (10)
- Expand the complex function $f(z) = \frac{1}{1 + z^2}$ in Laurent series valid for $0 < |z + i| < 2$. (10)
- Evaluate the complex line integral $\oint_C \frac{z^4}{z - 2i} dz$ where the path C is any closed contour enclosing $2i$. (10)
- Given the complex function $f(z) = \frac{z - 6i}{(z - 2)^2(z + 4i)}$. (10)
 - Find the poles for $f(z)$.
 - Determine the Residues for each pole of $f(z)$.
- Evaluate the real integral $\int_0^{2\pi} \frac{d\theta}{10 - 6\cos\theta}$. (10)