國立中央大學八十六學年度碩士班研究生入學試題卷

所別:

數學研究所

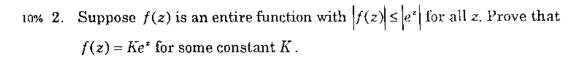
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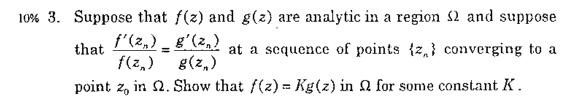
科目:

複變函數論

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15% 1. Find a conformal mapping f of the unit disc $\Delta = \{z: |z| < 1\}$ onto the upper half-plane with f(0) = i.





15% 4. Show that all the roots of $P(z) = z^5 + 6z^3 + 2z + 10$ lie in $\{1 < |z| < 3\}$.

15% 5. For the function $f(z) = 1/(1+z^4)$, find the principal part of the Laurent expansion valid in a deleted neighborhood of $z = e^{i\pi/4}$.

15% 6. If C is a simple closed curve enclosing the origin, evaluate

$$\int_C z^2 \sin \frac{1}{z} dz.$$

20% 7. Evaluate the following

$$(a)\int_{-\pi}^{\pi}\frac{1}{1+x^2}dx$$

$$(b)\int_{0}^{\infty}\frac{1}{1+x^{3}}dx.$$

