

Evaluate the following integral counterclockwise.  $\oint_C \cot \frac{z}{4} dz$  where  $C: |z|=1$ . [97 中央機械能源  
光機電生醫 7]

[解] 令  $f(z) = \cot \frac{z}{4} = \frac{\cos \frac{z}{4}}{\sin \frac{z}{4}}$ ,  $f(z)$  有單極點在  $z=0$

$$R_0 = \lim_{z \rightarrow 0} \left( \frac{\cos \frac{z}{4}}{\frac{1}{4} \cos \frac{z}{4}} \right) = 4$$

$$\oint_C \cot \frac{z}{4} = 2\pi i \cdot R_0 = 8\pi i$$

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