班級：______________學號：______________姓名：______________

國立台灣海洋大學河海工程研究所 BEM2004 第 10 次作業

1. In the course, we have derived the Poisson integral formule for the interior problem

   Closed-form

$$u(\rho,\phi)=\frac{1}{2\pi}\int_0^{2\pi}\frac{a^2-\rho^2}{[a^2+\rho^2-2a\rho\cos(\theta-\phi)]}f(\theta)d\theta,\quad 0<\rho<a,\quad 0<\phi<2\pi$$

   Series-form

$$u(\rho,\phi)=\frac{1}{2\pi}\int_0^{2\pi}[1+2\sum_{m=1}^{\infty}(\frac{\rho}{a})^m\cos(m(\phi-\theta))]f(\theta)d\theta,\quad 0<\rho<a,\quad 0<\phi<2\pi$$

   Please extend to exterior case,

   Closed-form

$$u(\rho,\phi)=\frac{1}{2\pi}\int_0^{2\pi}\frac{\rho^2-a^2}{[a^2+\rho^2-2a\rho\cos(\phi-\theta)]}f(\theta)d\theta,\quad 0<\rho<\infty,\quad 0<\phi<2\pi$$

   Series-form

$$u(\rho,\phi)=\frac{-1}{2\pi}\int_0^{2\pi}[1+2\sum_{m=1}^{\infty}(\frac{a}{\rho})^m\cos(m(\phi-\theta))]f(\theta)d\theta,\quad a<\rho<\infty,\quad 0<\phi<2\pi$$