

PHY505 - Classical Electrodynamics
Homework No. 7
Due: Wednesday, October 30, 2002

1. Jackson 4.8¹
2. Jackson 4.10
3. Jackson 4.11

¹A solution of the two-dimensional Laplace Equation $\nabla^2\psi = 0$ with

$$\nabla^2 = \frac{1}{r} \frac{\partial}{\partial r} r \frac{\partial}{\partial r} + \frac{1}{r^2} \frac{\partial^2}{\partial \theta^2}$$

in plane polar coordinates can be expanded in Fourier components as

$$\psi(r, \theta) = f_0(r) + \sum_{n=1}^{\infty} [f_n(r) \cos(n\theta) + g_n(r) \sin(n\theta)]$$

with

$$\begin{aligned} f_0 &= A_0 + B_0 \ln(r) \\ f_n &= A_n r^n + B_n r^{-n} \end{aligned}$$

and g_n of the same form as f_n .