MA523 HOMEWORK

ASSIGNMENT 2 – *due on Thursday, January 27, 2011*

1. Solve Problem 5 on page 102 of John.

2. Solve Problem 4 on page 102 of John in dimension three. Namely, show that for some constant C the function $\Phi(x) = C|x|$, $x \in \mathbb{R}^3$, is a fundamental solution for the bilaplacian Δ^2. Find the value of C.

Note that you have already proved that it is a solution in the last homework. So now you have justify that it is a fundamental solution, that is,

$$u(x) = \int_{\mathbb{R}^3} \Phi(x-y) f(y)\, dy, \quad x \in \mathbb{R}^n,$$

solves $\Delta^2 u = f$ in $\mathbb{R}^3$. This will naturally give you the value of the constant. Make sure you prove all the details, like I did in class today.