Math F608: Homework 3 **Due: September 25**

1. Evans 2.5.4a-c

2. Evans 2.5.8

3. Let U be a bounded domain. We defined in class that the Green's function for the Laplacian on U with singularity at x is given by $G(x,y) = \Phi(y-x) - \phi^x(y)$ where $\phi^x(y)$ is a $C^2(U) \cap C(\overline{U})$ function that solves

$$\begin{aligned} -\Delta_y \phi^x(y) &= 0 \quad \text{in } U \\ \phi^x(y) &= \Phi(y-x) \quad \text{for } y \in \partial U. \end{aligned}$$

Show that $G(x,y) > 0$ for every $y \in U$.