Autumn 2018 Math 256: Homework Assignment 3 Supplement

(The claim in Problem 9.5 as stated does not seem to correspond to what has been discussed in the text. We will change the problem as follows.)

Given a smooth domain $\Omega \subset \mathbb{R}^n$ and functions a_{ij}, b_i, α_i, $\beta \in C^\infty(\overline{\Omega})$ (with $i, j = 1, \dots, n$) with (a_{ij}) positive definite, $\sum_{i=1}^n \alpha_i \eta_i \neq 0$ (where η_i is the unit outward pointing normal of Ω). Prove that we can find ϵ_{ij}, $\gamma \in C^\infty(\overline{\Omega})$ with ϵ_{ij} anti-symmetric such that for every $u \in C^\infty(\overline{\Omega})$,

$$\begin{aligned} &\sum_{i,j=1}^n \eta_i (a_{ij} + \epsilon_{ij}) \partial_j u + \sum_{j=1}^n (\eta_j b_j + \gamma) u = 0 \text{ on } \partial\Omega \\ \implies &\sum_{i=1}^n \alpha_i \partial_i u + \beta u = 0 \text{ on } \partial\Omega. \end{aligned}$$