## PDE, Final exam suggestions

Here are some simplifications that may help. Of course, I would be very happy with complete solutions to the problems in the first version.

## Problems

Problem 1. A plausibility argument will suffice for (a). Use the denisty of $\mathcal{D}$ in $\mathcal{D}'$ for part (b).

Problem 2. Use mollification and the mean value property.

Problem 3. Assume $n = 3$. The calculation of the explicit solution is then quite direct in part (b).

Problem 4. To simplify matters suppose $g$ in $\mathcal{S}(\mathbb{R}^n)$.

Problem 6. Assume $n = 3$.

Problem 7. The problem for general $n \geq 3$ is no different than $n = 3$. As a first pass, don't worry about the constants in the fundamental solution.

Problem 8. Assume $n = 2$. If $B$ is the largest disk centered at 0 contained in $U$, use the Poisson kernel to find a harmonic function that is positive in $U \backslash B$.