Math 124B: PDEs

Homework #7

Problem 1: For each of the following functions $f(x)$, find the Fourier transform $F(k) = \widehat{f}(k)$.

(a) $f(x) = e^{-a|x|}$

(b) $f(x) = H(x)$ where $H(x)$ is the Heavyside function

$$H(x) = \begin{cases} 0 & x < 0 \\ 1 & x > 0 \end{cases}$$

(c) $f(x) = \delta'(x)$

Problem 2: Section 12.3 #6

Problem 3: Section 12.3 #9

Problem 4: Section 12.4 #1
You might want to use α and β instead of the Greek letters κ and μ — particularly so you don't confuse the constant 'kappa' with the variable 'k'!)

Problem 5: Section 6.1 # 2
Hint: Use the radial Laplacian (and set $u_\theta = u_\phi = 0$ since we are assuming u depends only on r), then find the PDE for the function v.)

Problem 6: Section 6.1 # 9
You may assume the solution will only depend on r.

Problem 7: Section 6.2 # 7