DISPERSIVE PDE 23, PROBLEM SET 7

(1) Carefully prove that if $(f, g) \in H^s(\mathbb{R}^n) \times H^{s-1}(\mathbb{R}^n)$, $s \geq 1$, and ψ is given by the formal wave propagator in Prop. 1. 3 of lecture 4.pdf, then in fact
$$\psi \in C^1(\mathbb{R}, H^{s-1}(\mathbb{R}^n)),$$
by showing that the expression obtained by formally time differentiating the wave propagator is the time derivative of ψ in the sense of Definition 1.2 of lecture 4.pdf.

(2) Complete the proof of Proposition 1. 5 by showing the assertion for the linear wave equation.

(3) Give the proof of Proposition 2.4 in lecture 4.pdf.