Do any 7 of the following 10 exercises of your choice. Write up your solutions neatly in your own handwriting, and show all your work!

1. Do problem 2 on page 313 of Folland. Note that $f^{(1)}$ will exist at all points other than the x_j's. It will help to reread the text above Theorem 9.1 on page 309, and to recall Theorem 7.3 on page 208.

2. Do problem 3 on page 313 of Folland. Interpret $(gF)'$ as the distribution which satisfies $(gF)'[\phi] = F'[g\phi]$, and gF' as the distribution which satisfies $gF'[\phi] = gF[\phi']$ for all test functions $\phi \in C_0^\infty$.

3. Do problem 4 on page 313 of Folland.

4. Do problem 5 on page 313 of Folland.

5. Do problem 6 on page 313 of Folland.

6. Do problem 1 on page 319 of Folland with $n = 1$. Note that Folland does not bother to explicitly distinguish between functions and distributions! Indeed, as discussed in class, any sufficiently nice function $F : \mathbb{R} \to \mathbb{C}$ can always be identified with an associated distribution defined by $F[\phi] := \int_{-\infty}^{\infty} F(x)\phi(x)\, dx$ for all $\phi \in C_0^\infty$. You should figure it out by context using the following guidelines whether Folland is talking about a given F as a function or as a distribution: pointwise and uniform convergence always refer to regular old functions $F : \mathbb{R} \to \mathbb{C}$, while weak convergence always refers to distributions.

7. Do problem 2 on page 320 of Folland.

8. Do problems 3 and 4 on page 320 of Folland with $n = 1$.

9. Do problem 5 on page 320 of Folland with $n = 1$.

10. Do problem 7 on page 320 of Folland.