

## Exercise 8

For the hydrogen atom, if  $\int |u|^2 d\mathbf{x} = 1$  at  $t = 0$ , show that the same is true at all later times. (*Hint:* Differentiate the integral with respect to  $t$ , taking care about the solution being complex valued. Assume that  $u$  and  $\nabla u \rightarrow 0$  fast enough as  $|\mathbf{x}| \rightarrow \infty$ .)