

1. Show $\|\cdot\|_1$ is a norm on $L^1([a, b])$.
2. For all $f, g \in L^2([a, b])$ define $\langle f, g \rangle = \int_a^b fg$.
 - (a) Show $\langle \cdot, \cdot \rangle$ is an inner product.
 - (b) Show that $\|\cdot\|_2$ is a norm.
3.
 - (a) Give an example of a function $f \in L^1((0, 1))$ that is not in $L^2((0, 1))$.
 - (b) Give an example of a function $f \in L^2([0, 1])$ that is not in $c([0, 1])$ set of continuous functions on $[0, 1]$.
 - (c) Give an example of a function $f \in L^2((1, \infty))$ that is not in $L^1((1, \infty))$.