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think of looking at the restriction map  $\alpha(f) = f|_{[-1, 1]}$ ,  $f \in A$ , and define a positive linear functional on  $\alpha(A)$  by  $G(\alpha(f)) = F(f)$  ( $G$  is well defined because  $\alpha$  is one-to-one by the analytic continuation principle). If  $G$  were continuous, we would use the denseness of  $\alpha(A)$  in  $C[-1, 1]$  to find a positive measure on  $[-1, 1]$  which represents  $G$  and therefore  $F$ . We know retrospectively that  $G$  must be continuous by the existence of such representing measure, but it is not easy to prove it.

In fact, the map  $\alpha(f) \mapsto f$  is not continuous (if  $\alpha^{-1}$  were continuous, then  $\alpha(A)$  would be complete. But  $\alpha(A)$  contains the polynomials, so it would be  $\alpha(A) = C[-1, 1]$ , which is incompatible with the existence of continuous non differentiable functions on  $[-1, 1]$ ).

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