

Prove that  $T_{\phi\psi} - T_{\phi}T_{\psi}$  is a compact operator if at least one of  $\phi$  and  $\psi$  is the sum of a function in  $\widetilde{H}^{\infty}$  and a function continuous on  $S^1$ . (Hint: In the continuous case, this can be established by approximating the continuous function by trigonometric polynomials and using the previous exercise. It can then be shown that adding a function in  $\widetilde{H}^2$  does not change  $T_{\phi\psi} - T_{\phi}T_{\psi}$ ).