Problem 6: Let γ be a measurable function such that

$$\int_{[0,x]} |\gamma(t)|^2 \, dt \leq \beta (1-x)^{\frac{-1}{2}}$$

for $0 < x < 1$ and β, a finte real constant. Show that the map

$$\Psi(f) := \int_{[0,x]} \frac{f(t)\gamma(t)}{\sqrt[4]{1-t}} dt$$

is a self operator with in the space of functions that are square integrable over the unit interval $[0,1]$.