$\Rightarrow \{x_i\}$ is a Cauchy sequence since (X, d) is complete then $\{x_i\}$ converges to some point $x \in X$ so the sequence $\{F x_i\}$ converges to Fx as $x_i \in F x_{i-1}$ $\forall i \Rightarrow x \in Fx$.

Question (H.W) The linear map $T: R^2 \to R^2$ is defined by $T(x, y) = \left(\frac{8x + 8y}{10}, \frac{x + y}{10} \right)$ and $d: R^2 \times R^2 \longrightarrow R^+$ is defined by

$$d(\underline{x}, \underline{y}) = \left[\sum_{i=1}^{n} (x_i - y_i)^2 \right]^{1/2}$$

where $\underline{x} = (x_1, x_2) \in R^2$, $\underline{y} = (y_1, y_2) \in R^2$ is the Euclidean Metric space ie (R^2, d) is the Euclidean Metric space and $\delta(\underline{x}, \underline{y}) = \sum_{i=1}^{n} |x_i - y_i|$ is also a metric on R^2. prove that T is a Contraction mapping with respect to the metric δ with $\alpha = \frac{9}{10}$ and T is not a contraction with the Euclidean Metric.

References: (1) Iterative approximation of fixed points by (Vesil. Berinde).

(2) Some topics in nonlinear functional analysis by Mohan C. Joshi (1985)

(3) lecture notes in fixed point Theorems by Bonsal.