Exercise 8 solution:

(a) Let $y = F^i(x)+j \in eo(x)$. Then $\pi(y) = \pi(F^i(x)+j) = \pi F^i(x) = f^i\pi(x)$, implying $\pi(y) \in o(\pi(x), f)$, or $y \in \pi^{-1}(o(\pi(x), f))$. We have $eo(x) \subset \pi^{-1}(o(\pi(x), f))$.

Suppose $\pi(y) \in o(\pi(x), f)$. Then $\pi(y) = f^i\pi(x)$ for some integer i. Hence $\pi(y) = \pi F^i(x)$, and $y = F^i(x) + j$ for some integer j. We have that $\pi^{-1}(o(\pi(x), f)) \subset eo(x)$, and thus $eo(x) = \pi^{-1}(o(\pi(x), f))$.

(b) Let $x \in \mathbf{R}$ and $I \subset \mathbf{R}$ be an interval. Since $o(\pi(x), r_\omega)$ is dense in $\mathbf{T}$, $r^i_\omega\pi(x) = \pi R^i_\omega(x) \in \pi(I)$ for some integer i. This implies $R^i_\omega(x) + j \in I$ for some integer j, so that $eo(x) \cap I \neq \emptyset$. Thus $eo(x)$ is dense in $\mathbf{R}$.