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INTUITIONISTIC WEAKLY SEMI OPEN FUNCTIONS

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ABSTRACT. The aim of this paper is to explore some characteristics of intuitionistic weakly semi open functions. The properties proved will lead to analyze the relations among intuitionistic weakly semi open function and other intuitionistic functions.

1. INTRODUCTION

Coker [1,2] introduced intuitionistic set and intuitionistic points in intuitionistic topological spaces. Open functions and continuity concepts are the prime tool in mathematics. Various weak forms of functions have been introduced [4, 7] in intuitionistic topological spaces. Since then many other authors [1, 4–7] investigated and studied different forms of intuitionistic topological spaces. The major role of this paper is to reveal the properties of intuitionistic weakly semi open functions and to obtain new decomposition in intuitionistic semi open functions.

2. PRELIMINARIES

Definition 2.1. *[3] Let X_1 be a nonempty set. An intuitionistic set (IS for short) M is an object having the form $M =< X_1, M_1, M_2 >$, where M_1 and M_2 are subsets*

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of X_1 satisfying $M_1 \cap M_2 = \emptyset$. The set M_1 is called the set of members of M, while M_2 is called the set of non-members of M.

Definition 2.2. *[3] An intuitionistic topology (IT for short) on a nonempty set X_1 is a family λ of IS's in X_1 satisfying the following axioms:*

(a) $\underset{\sim}{\emptyset}$, $\underset{\sim}{X_1} \in \lambda$
(b) $G_1 \cap G_2 \in \lambda$ *for any* G_1, $G_2 \in \lambda$
(c) $\cup G_i \in \lambda$ *for any arbitrary family* $\{G_i : i \in J\} \subseteq \lambda$.

In this case, the pair (X_1, λ) is called an intuitionistic topological space (ITS for short) and any intuitionistic set in λ is known as an intuitionistic open set (IOS for short) in X_1.

Definition 2.3. *[3] Let X_1, Y_1 be two non-empty sets and $h : (X_1, \lambda) \to (Y_1, \mu)$ be function.*

(a) *If $N =< X_1, N_1, N_2 >$ is an intuitionistic set in (Y_1, μ), then the preimage of N under h, denoted by $h^{-1}(N)$, is the intuitionistic set in (X_1, λ) defined by $h^{-1}(N) =< X_1, h^{-1}(N_1), h^{-1}(N_2) >$.*
(b) *(b) If $M =< X_1, M_1, M_2 >$ is an intuitionistic set in (X_1, λ), then the image of M under h, denoted by $h(M)$, is the intuitionistic set in (Y_1, μ) defined by $h(M) = Y_1, h(M_1), h_-(M_2) >$, where $h_-(M_2) = (h((M_2)^c))^c$.*

Definition 2.4. *[3] Let (X_1, λ) and (Y_1, μ) be two ITS's and let $h : (X_1, \lambda) \to (Y_1, \mu)$ be a function. The function*

(i) *h is said to be intuitionistic continuous iff the preimage of each IS in μ is an IS in λ.*
(ii) *h is said to be intuitionistic open iff the image of each IS in λ is an IS in μ.*
(iii) *is said to be intuitionistic semi continuous, if the inverse image of every intuitionistic open set of (Y_1, μ) is intuitionistic semi open in (X_1, λ).*

Definition 2.5. *[4] An intuitionistic function $h : (X_1, \lambda) \to (Y_1, \mu)$ is defined as intuitionistic weakly open (Iwo shortly) if $h(M) \subseteq Iint(h(Icl(M)))$ for each intuitionistic open set M of X_1.*

3. Intuitionistic weakly semi open function

Definition 3.1. *An intuitionistic function $h : (X_1, \lambda) \to (Y_1, \mu)$ is defined as intuitionistic weakly semi open $(Iwso$ shortly$)$ if $h(M) \subseteq Isint(h(Icl(M)))$ for each intuitionistic open set M of X_1.*

Remark 3.1. *Every intuitionistic semi open function is intuitionistic weakly semi open but the converse need not be true.*

Proof. : Let $h : (X_1, \lambda) \to (Y_1, \mu)$ be an intuitionistic semi open function. Let M be an intuitionistic open set in $(X_1, \lambda), M = Iint(M)$. Since h is an intuitionistic semi open function, $h(M) \subset Isint(h(M))$. But for any set $M \subset Icl(M) \Rightarrow h(M) \subset h(Icl(M))$. Hence $h(M) \subset Isint(h(Icl(M)))$, h is an intuitionistic weakly semi open function. $\square$

Example 1. *Let $X_1 = \{a_1, b_1, c_1\}$, with intuitionistic topology $\lambda = \{\underset{\sim}{\emptyset}, < X_1, \{a_1\}, \{b_1\} >, < X_1, \emptyset, \{a_1\} >, < X_1, \emptyset, \{a_1, b_1\} >, < X_1, \{a_1\}, \emptyset >, < X_1, \{c_1\}, \{a_1, b_1\} >, < X_1, \{a_1, c_1\}, \emptyset >, < X_1, \{a_1, c_1\}, \{b_1\} >, < X_1, \{c_1\}, \{a_1\} >, \underset{\sim}{X_1}\}$ and $Y_1 = \{3, 4, 5\}$, with intuitionistic topology $\mu = \{\underset{\sim}{\emptyset}, < Y_1, \{3, 4\}, \{5\} >, < Y_1, \emptyset, \{5\} >, < Y_1, \emptyset, \{4, 5\} >, < Y_1, \{5\}, \emptyset >, \underset{\sim}{Y_1}\}$. Define $h : (X_1, \lambda) \to (Y_1, \mu)$ by $h(a_1) = 5$, $h(c_1) = 3$ and $h(b_1) = 4$. Then h be intuitionistic weakly semi open with $G =< X_1, \{c_1\}, \{a_1\} >$, but $h(G) =< Y_1, \{3\}, \{5\} >$ is not an intuitionistic semi open set in (Y_1, μ).*

Theorem 3.1. *For an intuitionistic function $h : (X_1, \lambda) \to (Y_1, \mu)$ the following statements are equivalent.*

(i) *h is intuitionistic weakly semi open.*
(ii) *For each $x \in X_1$ and each intuitionistic open set M of (X_1, λ) containing $\underset{\sim}{x}$, there exists an intuitionistic semi open set K containing $h(\underset{\sim}{x})$ such that $K \subset h(Icl(M))$.*

Proof.

(i)$\to$ (ii) Let $x \in X_1$ and M be an intuitionistic open set in (X_1, λ) with $\underset{\sim}{x} \in M$. Since h is intuitionistic weakly semi open, $h(\underset{\sim}{x}) \in h(M) \subset Isint(h(Icl(M)))$. Let $K = Isint(h(Icl(M))) \subset h(Icl(M)))$.

(ii)$\to$ (i) Let M be an intuitionistic open set in X_1 and let $\underset{\sim}{y} \in h(M)$. From (ii), $K \subset h(Icl(M))$ for some intuitionistic semi open set in (Y_1, μ) containing $\underset{\sim}{y}$. Hence, $\underset{\sim}{y} \in K \subset Isint(h(Icl(M)))$. This implies $h(M) \subset Isint(h(Icl(M)))$ and thus h is an intuitionistic weakly semi open function.

□

Theorem 3.2. *Let $h : (X_1, \lambda) \to (Y_1, \mu)$ be an intuitionistic bijective function. Then the the following statements are equivalent.*

(i) *h is intuitionistic weakly semi open.*
(ii) *$Iscl(h(Iint(K) \subset h(K)$ for each K, intuitionistic closed set in X_1.*
(iii) *$Iscl(h(M)) \subset h(Icl(M))$ for each M, intuitionistic open in X_1.*

Proof.

(i)$\to$ (ii) Let K be intuitionistic closed set in X_1. Then $h(X_1 - K) = \underset{\sim}{Y_1} - h(K) \subset Isint(h(Icl(X_1 - K)))$ which implies $\underset{\sim}{Y_1} - h(K) \subset \underset{\sim}{Y_1} - Iscl(h(Iint(K)))$. Hence $Iscl(h(Iint(K))) \subset h(K)$.

(ii)$\to$ (iii) Let M be an intuitionistic open set in X_1. Since every open set is intuitionistic semi open set, that is $M \subset Icl(Iint(M))$, $h(M \subset h(Icl(Iint(M)))$, $h(M \subset h(Icl(M))$, since $M = Iint(M)$. But $Iscl(h(M)) \subset (h(Icl(Icl(M))) \subset h(Icl(M))$.

(iii)$\to$ (i) Let M be an intuitionistic open set in X_1. Then $h(X_1 - M) = Y_1 - h(M)$, $Iscl(h(M)) \subset h(Icl(M))$. Therefore $Iscl(h(X_1 - M) \subset h(Icl(X_1 - M)) \Rightarrow Y_1 - Isint(h(Icl(M))) \subset Y_1 - h(Iint(M)) \Rightarrow Y_1 - Isint(h(Icl(M))) \subset Y_1 - h(Iint(M))$. Hence $h(M) \subset Isint(h(Icl(M))$.

□

Theorem 3.3. *If $h : (X_1, \lambda) \to (Y_1, \mu)$ is intuitionistic weakly semi open and intuitionistic strongly continuous, then h is intuitionistic semi open.*

Proof. Let M be an intuitionistic open set of X_1. Since h is intuitionistic weakly semi open, $h(M) \subset Isint(h(Icl(M)))$ and h is intuitionistic strongly continuous $h(M) \subset Isint(h(M))$, thus $h(M)$ is intuitionistic semi open. □

Remark 3.2. *An intuitionistic semi open function need not be intuitionistic strongly continuous.*

Example 2. *Let* $X_1 = \{6, 7\} = Y_1$, *with intuitionistic topology*

$$\lambda = \{\underset{\sim}{\emptyset}, < X_1, \{6\}, \{7\} >, < X_1, \emptyset, \{6\} >, < X_1, \{6\}, \emptyset, >, \underset{\sim}{X_1}\}$$

and

$$\mu = \{\underset{\sim}{\emptyset}, < Y_1, \emptyset, \{6\} >, < Y_1, \emptyset, \{7\} >, < Y_1, \emptyset, \emptyset >, \underset{\sim}{Y_1}\}.$$

Define $h : (X_1, \lambda) \to (Y_1, \mu)$ *by* $h(6) = 6$ *and* $h(7) = 7$. *Then h be intuitionistic semi open but not intuitionistic strongly continuous since*

$$G =< X_1, \{6\}, \{7\} >, h(Icl(G)) = h(< X_1, \{6\}, \emptyset, >) =< Y_1, \{6\}, \emptyset, >\not\subseteq h(G).$$

Definition 3.2. *[4] An intuitionistic function* $h : (X_1, \lambda) \to (Y_1, \mu)$ *is said to be an intuitionistic contra open* (*respectively intuitionistic contra closed*) *if* $h(M)$ *is intuitionistic closed* (*respectively intuitionistic open*) *in* Y_1 *for each intuitionistic open* (*respectively intuitionistic closed*) *set M of* X_1.

Theorem 3.4.

(i) *If* $h : (X_1, \lambda) \to (Y_1, \mu)$ *is intuitionistic contra closed, then* h *is intuitionistic weakly semi open function.*

(ii) *If* $h : (X_1, \lambda) \to (Y_1, \mu)$ *is intuitionistic preopen and intuitionistic contra open, then* h *is intuitionistic weakly semi open.*

Proof.

(i) Let M be an intuitionistic open set of (X_1, λ). Then, $h(M) \subset h(Icl(M))) = Isint(h(Icl(M)))$. Hence h is intuitionistic weakly semi open.

(ii) Let M be an intuitionistic open set of (X_1, λ). h is intuitionistic preopen, $h(M) \subset Iint(Icl(h(M)))$ and also h is intuitionistic contra open implies $h(M)$ is intuitionistic closed. Hence $h(M) \subset Iint(Icl(h(M))) = Iint(h(M)) \subset Iint(h(Icl(M))) \subset Isint(h(Icl(M)))$.

□

Remark 3.3. *The converse of the above Theorem 3.4 need not hold.*

Example 3. *Let*$X_1 = \{u_1, v_1\}$ *with intuitionistic topology*

$$\lambda = \{\underset{\sim}{\emptyset}, < X_1, \{v_1\}, \emptyset >, < X_1, \{v_1\}, \{u_1\} >, \underset{\sim}{X_1}, \}$$

and $Y_1 = \{3, 4\}$ *with intuitionistic topology*

$$\mu = \{\underset{\sim}{Y_1}, \underset{\sim}{\emptyset}, < Y_1, \{3\}, \emptyset >, < Y_1, \{3\}, \{4\} >\}.$$

Define $h(u_1) = 4$ *and* $h(v_1) = 3$. *Since* $M =< X_1, \{v_1\}, \{u_1\} >$ *is an intuitionistic weakly semi open set in* (X_1, λ) *but* $Isint(h(Icl(M))) = \underset{\sim}{Y_1} \not\subseteq < Y_1, \{3\}, \{4\} >$. *Then h is an intuitionistic weakly semi open mapping but not an intuitionistic contra closed mapping.*

Definition 3.3. *An intuitionistic function* $h : (X_1, \lambda) \to (Y_1, \mu)$ *is said to be intuitionistic almost open if* $h(M) \subset Iint(Icl(h(M)))$ *for every intuitionistic regular open set* M *of* (X, λ).

Theorem 3.5. *If* $h : (X_1, \lambda) \to (Y_1, \mu)$ *is an intuitionistic almost open function then it is an intuitinistic weakly semi open function.*

Proof. : Let M be an intuitinistic open set in (X_1, λ). If h is intuitionistic almost open and $Iint(Icl(M))$ is intuitionistic regular open, $h(Iint(Icl(M)))$ is intuitionistic open in Y then $h(M) \subset h(Iint(Icl(M)) \subset Iint(h(Icl(M))) \subset Isint(h(Icl(M)))$ which proves that h is intuitionistic weakly semi open. □

Remark 3.4. *The converse of the above Theorem 3.5 need not be true.*

Example 4. *Let*$X_1 = \{r_1, s_1\} = Y_1$ *with intuitionistic topologies* $\lambda = \{\underset{\sim}{X_1}, \underset{\sim}{\emptyset}, < X_1, \{s_1\}, \emptyset >, < X_1, \{s_1\}, \{r_1\} >\}$ *and* $\mu = \{\underset{\sim}{Y_1}, \underset{\sim}{\emptyset}, < Y_1, \{r_1\}, \emptyset >, < Y_1, \{r_1\}, \{s_1\} >, < Y_1, \emptyset, \{r_1\} >\}$ *respectively. Define* $h : (X_1, \lambda) \to (Y_1, \mu)$ *as* $h(r_1) = r_1, h(s_1) = s_1$. *Then h is an intuitionistic weakly semi open function but not an intuitionistic almost open, since* $Iint(h(Icl(< X_1, \{r_1\}, \{s_1\} >))) = \underset{\sim}{\emptyset}$.

Definition 3.4. *Let* (X_1, λ) *be an intuitionistic regular space if for each pair consisting of an intuitionistic point* $\underset{\sim}{x}$ *and an intuitionistic closed set K disjoint from* $\underset{\sim}{x}$, *there exists disjoint intuitionistic open sets containing* $\underset{\sim}{x}$ *and K respectively.*

Theorem 3.6. *Let* X_1 *be an intuitionistic regular space. Then* $h : (X_1, \lambda) \to (Y_1, \mu)$ *is intuitionistic weakly semi open if and only if* h *is intuitionistic semi open.*

Proof. : Necessity. Let M be nonempty intuitionistic open set of X_1. For each $\underset{\sim}{x} \in M$, let K_p be an intuitionistic open set such that $\underset{\sim}{x} \in K_p \subset Icl(K_p) \subset M$. Hence $M = \cup\{K_p : \underset{\sim}{x} \in M\} = \cup\{Icl(K_p) : \underset{\sim}{x} \in M\}$ and $h(M) = \cup\{h(K_p) : \underset{\sim}{x} \in M\} \subset \cup\{Isint(h(Icl(K_p))) : \underset{\sim}{x} \in M\} \subset Isint(h(\cup\{Icl(K_p) : \underset{\sim}{x} \in M\})) = Isint(h(M))$. Thus h is intuitionistic semi open.

The converse part is obvious. □

Definition 3.5. *An intuitionistic function $h : (X_1, \lambda) \to (Y_1, \mu)$ is called intuitinistic complementary weakly semi open if for each intuitionistic open set M of (X_1, λ), $h(IFr(M))$ is intuitionistic semi closed in (Y_1, μ), where $IFr(M)$ denotes intuitionistic frontier of M.*

Remark 3.5. *The intuitionistic weakly semi open and complementary intuitionistic weakly semi open are independent of each other.*

Example 5. *An intuitionistic weakly semi open function need not be an complementary intuitionistic weakly semi open. Let $X_1 = \{a, b\}$ with intuitionistic topology $\lambda = \{\underset{\sim}{\emptyset}, A_1, A_2, A_3, \underset{\sim}{X_1}\}$ where $A_1 =< X_1 \{a\}, \{b\} >, A_2 =< X_1, \emptyset, \{a\} >, A_3 =< X_{1,} \{a\}, \emptyset >$. Let $Y_1 = \{7, 8\}$ with intuitionistic topology $\mu = \{\underset{\sim}{\emptyset}, B_1, B_2, B_3, \underset{\sim}{Y_1}\}$ where $B_1 =< Y_{1,} \emptyset, \{7\} >, B_2 =< Y_{1,} \emptyset, \{8\} >, B_3 =< Y_1, \emptyset, \emptyset >$. Then the map $h : (X_1, \lambda) \to (Y_1, \mu)$ be given by $h(a) = 7$and $h(b) = 8$. The map h is intuitionistic weakly semi open, but not a complementary intuitionistic weakly semi open, because $Fr(< X_1, \emptyset, \{a\} >) =< X_1, \emptyset, \{a\} > \cap < X_{1,} \{a\}, \emptyset >=< X_1, \emptyset, \{a\} >$, $h(< X_1, \emptyset, \{a\} >) =< Y_{1,} \emptyset, \{7\} >$ which is not an intuitionistic semi closed set in (Y, μ).*

Example 6. *Let $X_1 = \{p_1, q_1, r_1\}$, with intuitionistic topology $\lambda = \{\underset{\sim}{\emptyset}, < X_1, \{p_1\}, \{q_1\} >, < X_1, \emptyset, \{p_1\} >, < X_1, \emptyset, \{p_1, q_1\} >, < X_1, \{p_1\}, \emptyset >, < X_1, \{r_1\}, \{p_1, q_1\} >, < X_1, \{p_1, r_1\}, \emptyset >, < X_1, \{p_1, r_1\}, \{q_1\} >, < X_1, \{r_1\}, \{p_1\} >, \underset{\sim}{X_1}\}$ and let $Y_1 = \{l, m\}$with intuitionistic topology $\mu = \{\underset{\sim}{\emptyset}, < Y_1, \{m\}, \emptyset >, < Y_1, \{m\}, \{l\} >, \underset{\sim}{Y_1}\}$. Define the mapping $h : (X_1, \lambda) \to (Y_1, \mu)$ as $h(p_1) = m, h(q_1) = l$ and $h(r_1) = m$. Let $Fr(< X_1, \{p_1\}, \{q_1\} >=< X_1, \emptyset, \{p_1\} >$, then $h(< X_1, \emptyset, \{p_1\} >) =< Y_1, \emptyset, \{m\} >$, which is intuitionistic semi closed in (Y, μ). Hence every complementary intuitionistic weakly semi open function but it is not intuitionistic weakly semi open.*

Lemma 3.1. *[2] If $h : (X_1, \lambda) \to (Y_1, \mu)$ is an intuitionistic continuous function, then for any intuitionisitc set M of X, $h(Icl(M)) \subset Icl(h(M))$.*

Theorem 3.7. *If $h : (X_1, \lambda) \to (Y_1, \mu)$ is an intuitionistic weakly semi open and intuitionistic continuous function then h is an intuitionistic β open function.*

Proof. Let M be an intuitionistic open set in (X_1, λ). Being intuitionistic weak semi openness of h, $h(M) \subset Isint(h(Icl(M)))$. Since h is intuitionistic continuous, $h(Icl(M)) \subset Icl(h(M))$. Hence $h(M) \subset Isint(h(Icl(M))) \subset Isint(Icl(h(M)))$

$\subset Icl(Iint(Icl(h(M))))$. Thus $h(M) \subset Icl(Iint(Icl(h(M))))$ which implies that $h(M)$ is an intuitionistic β open set in (Y_1, μ). Thus h is an intuitionistic β open function. □

Corollary 3.1. *If $h : (X_1, \lambda) \to (Y_1, \mu)$ is an intuitionistic weakly semi open and intuitionistic strongly continuous function, then h is an intuitionistic β open function.*

Proof. Let M be an intuitionistic open set in (X_1, λ). By intuitionistic weak semi openness of h, $h(M) \subset Isint(h(Icl(M)))$. Also h is intuitionistic strongly continuous, $h(Icl(M)) \subset Icl(h(M))$. Therefore $h(M) \subset Isint(h(Icl(M))) \subset Isint(Icl(h(M))) \subset Icl(Iint(Icl(h(M))))$. Hence $h(M) \subset Icl(Iint(Icl(h(M))))$, $h(M)$ is an intuitionistic β open set in (Y_1, μ). Thus h is an intuitionistic β open function. □

Definition 3.6. *An intuitionistic function $h : (X_1, \lambda) \to (Y_1, \mu)$ is defined as intuitionistic somewhat continuous if for each intuitionistic open set K of (Y_1, μ) with $h^{-1}(K) \neq \underset{\sim}{\emptyset}$, there exists an IO set M of (X_1, λ) such that $\underset{\sim}{\emptyset} \neq M \subset h^{-1}(K)$.*

Theorem 3.8. *If $h : (X_1, \lambda) \to (Y_1, \mu)$ is intuitionistic weakly open and intuitionistic somewhat continuous injection, then it is intuitionistic semi irresolute.*

Proof. Let $K \in ISO(Y_1, \mu)$ and $\underset{\sim}{x} \in h^{-1}(K)$. Let $\underset{\sim}{y} = h(\underset{\sim}{x})$ and let G be any intuitionistic open neighbourhood of $\underset{\sim}{x}$. Since h is intuitionistic weakly open, $\underset{\sim}{y} \in h(G) \cap K \subseteq Iint(h(Icl(G))) \cap K \in ISO(Y_1, \mu)$. There exists an intuitionistic open set M such that $\underset{\sim}{\emptyset} \neq M \subset Iint(h(Icl(G))) \cap K$. But h is somewhat continuous and $h^{-1}(M) \neq \underset{\sim}{\emptyset}$, there exists an intuitionistic open set N of (X_1, λ) such that $\underset{\sim}{\emptyset} \neq N \subset h^{-1}(M)$. Hence $N \subset Icl(G) \cap h^{-1}(K)$ and $N \subset Icl(G) \cap Iint(h^{-1}(K))$, h is injective. Thus $\underset{\sim}{\emptyset} \neq Icl(G) \cap \cap Iint(h^{-1}(K))$ and $\underset{\sim}{\emptyset} \neq G \cap Iint(h^{-1}(K))$. This implies $\underset{\sim}{x} \in Icl(Iint(h^{-1}(K)))$ and $h^{-1}(K) \in ISO(X_1, \lambda)$. □

Definition 3.7. *A function $h : (X_1, \lambda) \to (Y_1, \mu)$ is called an intuitionistic weakly semi closed if $Iscl(h(Iint(K))) \subset h(K)$ for each closed set K in (X_1, λ).*

Theorem 3.9. *For a function $h : (X_1, \lambda) \to (Y_1, \mu)$ the following conditions are equivalent.*

(i) *h is intuitionistic weakly semi closed.*

(ii) $Iscl(h(M)) \subset h(Icl(M))$ *for every intuitionistic open set* M *of* (X_1, λ).

Proof.

(i)⇒ (ii) Let M be any intuitinistic open set of (X_1, λ). Then $Iscl(h(M)) = Iscl(h(Iint(M))) \subset Iscl(h(Iint(Icl(M)))) \subset h(Icl(M))$.

(ii)⇒ (i) Let K be any intuitionistic closed set of (X_1, λ). Then $Iscl(h(Iint(K))) \subset h(Icl(Iint(K))) \subset h(Icl(K)) = h(K)$.

□

Corollary 3.2. *If* h *is intuitionsitic pre semi closed function then* $Iscl(h(M)) \subset h(Iscl(M))$ *for every intuitionistic set* M *of* (X_1, λ). *Thus every intuitionistic pre semi closed function is intuitionistic weakly semi closed.*

Theorem 3.10. *If* $h : (X_1, \lambda) \to (Y_1, \mu)$ *is one to one and intuitionistic weakly semiclosed, then for every intuitionistic set* K *of* (Y_1, μ) *and every intuitionistic open set* M *in* (X_1, λ) *with* $h^{-1}(K) \subset M$*, there exists an intuitionistic semi closed set G in* (Y_1, μ) *such that* $K \subset G$ *and* $h^{-1}(K) \subset Icl(M)$.

Proof. Let K be an intuitionistic set of (Y_1, μ) and let M be an intuitionistic open set of (X_1, λ) with $h^{-1}(K) \subset M$. Let $G = Iscl(h(Iint(Icl(M))))$, then G is intuitionistic semi closed set of (Y_1, μ) such that $K \subset G$. But $K \subset h(M) \subset h(Iint(Icl(M))) \subset Iscl(h(Iint(Icl(M)))) = G$. □

Corollary 3.3. *If* $h : (X_1, \lambda) \to (Y_1, \mu)$ *is one to one and intuitionistic weakly semi closed, then for every intuitionistic point* $\underset{\sim}{x} \in (Y_1, \mu)$ *and every intuitionsitc open set M in* (X_1, λ) *with* $h^{-1}(\underset{\sim}{x}) \subset M$*, then there exists an intuitionistic semi closed set* $G \in (Y_1, \mu)$ *containting* $\underset{\sim}{x}$ *such that* $h^{-1}(G) \subset Icl(M)$.

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