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Further, Axiom, $i = 1, 3, 4, 5$, holds in (X, e) if it holds in (X, d). If Axiom 2 holds in (X, d) *and* f is one to one, the Axiom 2 holds in (X, e).

Corollary 17. If (X, d) is a pseudo-directed distance space, then so is (X, e). If (X, d) is a directed distance space and f is one to one, then (X, e) is also a directed distance space.

Remarks. In retrospect, I notice that the associative law of the group G has never been used. Hence, the role of G could be played by a somewhat weaker concept, namely that of a loop with the inverse property. [1, p. 7].

I am indebted to David Makinson for the idea of Proposition 5.

Since first writing this paper, it has been pointed out to me that the axioms for a directed distance space are similar to the axioms for an affine space. [2, p. 420-5, esp. (6) and (7) on p. 421. There is a misprint in (6).] There, the values are assumed to lie in a vector space rather than in a group. In addition to axioms 1, 2 and 4, it is assumed in [2] that

6. $\forall x \varepsilon X, \quad \forall g \varepsilon G, \quad \exists ! y \varepsilon X : d(y,x) = g.$

(In the notation of [2], this would be written as $g+x=y$). This assumption is equivalent to the assertion that for each $a \varepsilon x$, the mapping f_a of Theorem 14 is onto. Hence our result, Corollary 15, could be improved to assert that f_a is an isometry onto and we can say that the only G-directed distance space satisfying 6 is G itself.

REFERENCES

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2. MACLANE, S. and G. BIRKHOFF: *Algebra*, Macmillan, New York, 1967.

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