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

1. HALL, M. Jr.: *The Theory of Groups*, Macmillan, New York, 1959.
2. MACLANE, S. and G. BIRKHOFF: *Algebra*, Macmillan, New York, 1967.

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