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Algebraic Proof of the Distributive Law for Vector Multiplication

CHARLES KORN, Ben Gurion University — Courses in first year mechanics generally start with an introduction to vector methods which include scalar and vector multiplication[1]. While the demonstration of the validity of the distributive law for scalar multiplication is straightforward, this is not so for vector multiplication. The latter requires complicated geometrical visualization, so its proof is often skipped[1]. Neither the commutative nor associative law holds for vector multiplication, so there is no a priori reason that the distributive law should hold. In this paper we present an algebraic approach to the proof that requires no geometric visualization. It is based on two relations: (1) the distributive law for scalar multiplication and (2) a*(bxc)=c*(axb)=b*(cxa). 1. e.g. C. Kittlel, W.D. Knight, M.A. Ruderman, Mechanics, Berkeley Physics Course Vol. 1, 2nd ed. McGraw Hill, pp34-39.

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