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COMPUTER SCIENCE

MAT 204 ASSIGNMENT.

1. Analyze linear transformation giving 5 examples each

LINEAR TRANSFORMATION is a functions that carries elements of vector space U (called domain) to the vector space V (called codomain) and which has two additional properties

* For all x, y, ℇ v, T (x + y) = T(x) + T(y)
* For all x ℇ v, r ℇ R, T(rx) = rT(x)

Examples

Example 1. Let V = R2 and let W = R. Deﬁne f: V → W by f(x1, x2) = x1x2. Thus, f is a function deﬁned on a vector space of dimension 2, with values in a one-dimensional space. The notation is highly suggestive; that is, f : V → W indicates that f does something to a vector in V to get a vector in W. For example, f (1, −1) = −1, f (1,2) = 2, etc. We will see later that this function does not satisfy the “linearity” condition and hence is not a linear transformation.

Example 2. Let V = R2 and W = R3. Deﬁne L: V → W by L (x1, x2) = (x1, x2 −x1, x2). Here the function L takes a vector in R2 and transforms it into a vector in R3.