Mohammad Ali Jinnah University

Chartered by Government of Sindh - Recognized by HEC

Quiz 3

Name: Muhamad Fahad

Id: FA19-BSSE-0014

Subject: Linear Algebra (Fall 2020)

Section: AM

Teacher: Dr. Asmat Ara

Date: Friday, December 11, 2020

Student Name: **Muhammad Fahad** Student I.D. **FA19-BSSE-0014**

Mohammad Ali Jinnah University

Linear Algebra
Quiz 3
Morning Program

Instructor Name: Dr. Asmat Ara

Total Marks:10

Date: 9- 12 -2020 **Time:**

Q#1 If V be the set of all ordered pairs of real numbers, and consider the following addition and scalar multiplication operations on u = (u_1, u_2) and v = (v_1, v_2):

$$u + v = (u_1 + v_1, u_2 + v_2)$$

$$kv = (0, kv_2)$$

A. Compute u + v and kv for u = $(2, 1)$ and v = $(2,4)$, and k = 2.
B. V is the standard addition operation on R^2,certain vector space axioms hold for V because they are known to hold for R^2,which axioms are they?
C. Show that Axiom 7, 8, and 9 hold.
D. Show that Axiom 10 fail.

Muhammad Fahad
FA19 - BSSE - 0014

Quiz # 3

Date: 11/12/2020

Q1)

•) $U+V=(U_1+V_1, U_2+V_2)$
•) $KV=(0, V_2)$

A) Compute $U+V$ and KV $(U=(2,1)$ & $V=(2,4)$ & $K=2)$

$U+V=(U_1+V_1, U_2+V_2)$

$U+V=(2+2, 1+4)$
$U+V=(4, 5)$

Ans.

$KV=K(V_1, V_2)$
$KV=2(2,4)$ $\quad [\because KV=(0,V_2)]$
$KV=(0, 8)$

B)
i) $U+V\in V$

$(U_1, U_1)+(V_1, V_2)\in V$
$(U_1+V_1, U_2+V_2)\in V$ (H.P)

ii) $U+V=V+U$

$(U_1, U_2)+(V_1, V_2)=(V_1, V_2)+(U_1, U_2)$
$(U_1+V_1),(U_2+V_2)=(V_1+U_1),(V_2+U_2)$ (H.P)

iii) $U+(V+W) = (U+V)+W$

$(U_1, U_2)+((V_1, V_2)+(W_1, W_2)) = ((U_1, U_2)+(V_1, V_2))+(W_1, W_2)$

$(U_1, U_2)+(V_1+W_1, V_2+W_2) = (U_1+V_1, U_2+V_2)+(W_1, W_2)$

$(U_1+V_1+W_1, U_2+V_2+W_2) = (U_1+V_1+W_1, U_2+V_2+W_2)$ (H.P)

iv) $U+0=U$

$(U_1, U_2)+(0,0) = (U_1, U_2)$

$(U_1+0, U_2+0) = (U_1, U_2)$

$(U_1, U_2) = (U_1, U_2)$ (H.P)

v) $U+(-U)=0$

$(U_1, U_2)+(-(U_1, U_2)) = (0,0)$

$(U_1-U_1, U_2-U_2) = (0,0)$

$(0,0) = (0,0)$ (H.P)

C) Show that Axiom 7, 8 & 9 hold

7) $K(U+V) = KU + KV$

$K(U_1, U_2) + (V_1, V_2) = K(U_1, U_2) + K(V_1, V_2)$

$K(U_1 + V_1, U_2 + V_2) = (KU_1, KU_2) + (KV_1, KV_2)$

$(K(U_1 + V_1), K(U_2 + V_2)) = (0, KU_2) + (0, KV_2)$

$(0, K(U_2 + V_2)) = (0, (KU_2 + KV_2))$

$(0, K(U_2 + V_2)) = (0, K(U_2, V_2))$ (Hold)

Ans

8) $(K+m)U = KU + mU$

$(K+m)U_1, (K+m)U_2 = K(U_1, U_2) + m(U_1, U_2)$

$(0, (K+m)U_2) = (0, (K+m)U_2)$

$(0, (K+m)U_2) = (0, (K+m)U_2)$ (HOlD)

Ans

9) $k(mu) = (km)u$

$k(m(u_1, u_2)) = (km)(u_1, u_2)$

$k(mu_1, mu_2) = (\cancel{k}0, (km)u_2)$

$\cancel{k}(0, kmu_2) = (0, (km)u_2)$

$(0, (km)u_2) = (0, (km)u_2)$ Hold

Ans

D) Show that Axiom 10 fail.

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$1 \cdot u = u$

$1 \cdot (u_1, u_2) = (u_1, u_2)$

$(0, u_2) \neq (u_1, u_2)$ (fail)