**MAT 204 Assignment**

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 **Question 1**

1. A **linear combination** of two or more **vectors** is the **vector** obtained by adding two or more **vectors** (with different directions) which are multiplied by scalar values.
2. A Sequence of vector is said to linearly independent if there exist scalars not all zero , it can also be defined by that a sequence of vectors is linearly dependent if and only if some vector in that sequence can be written as a linear combination of the other vectors

**QUESTION 2**

 SPANNING SET OF R

U= (1,0,1), V= (2,1,3), W= (1,1, -4).

 $α\left(\begin{matrix}1\\0\\-1\end{matrix}\right)$ + $β\left(\begin{matrix}2\\1\\3\end{matrix}\right)+γ\left(\begin{matrix}1\\1\\-4\end{matrix}\right)=\left(\begin{matrix}a\\b\\c\end{matrix}\right)$

 $α+2β+γ=a$ 1

 $β+γ=b$ 2

 $-α+3β-4γ=c$ 3

 Using equation 2

 $β+γ=b$

 $β=b-γ$ 4

Put equation 4 into equation 1 and equation 3

 $α+2\left(b-γ\right)+γ=a$

 $α+2b-2γ+γ=a$

 $α+2b-γ=a$

 $α-γ=a-2b$ 5

 $-α+3\left(b-γ\right)-4γ=c$

 $-α+3b-3γ-4γ=c $

 $-α+3b-7γ=c$

 $-α-7γ=c-3b$ 6

 Compare 5 and 6

 $α-γ=a-2b$

 + $-α-7γ=c-3b $

 $-8α=\left(a-2b\right)+\left(c-3b\right)$

 $-8α=a-5β+c $

 $γ=\frac{a-5b+c}{-8}$

 $γ=\frac{-(a-5b+c)}{8}$

 $γ=\frac{-a+5b-c}{8}$

 Put $γ$ into equation 2

 $β+( \frac{-a+5b-c }{8}$) = b

 $β=b-\left(\frac{-a+5b-c}{8}\right)$

 $=b+ \frac{a-5b+c}{8}$

 = $\frac{8b+a-5b+c }{8}$

 $β= \frac{a+3b+c}{8}$

 Put $γ and β into equation 1 $

 $α+2\left(\frac{a+3b+c}{8}\right)+\frac{-a+5b-c}{8}=a$

 $α+ \frac{a+3b+c}{4}+\frac{-a+5b-c}{8}=a $

 $α=a \left(\frac{a+3b+c }{4}\right)- \left(\frac{-a+5b-c }{8}\right)$

 $=a-\frac{a-3b-c}{4}+ \frac{a-5b+c}{8}$

$= \frac{8a+2\left(-a-3b-c\right)+a-5b+c}{8}$

$= \frac{8a-2a-6b-2c+a-5b+c }{8}$

$α=\frac{7a-11b-c}{8}$

 QUESTION 3

1. Commutativity of vector addition

$x+y=y+x$

1. Associativity of vector addition

$\left(x+y\right)+z=x+\left(y+z\right)$

1. Identity element of addition

$x+0=x$

1. Distributivity of scalar multiplication with respect to vector addition

$α\left(x+y\right)=αx+αy$