**MTH501 Assignment #1 Fall 2023**

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**Question:**

Let 𝑣1=, 𝑣2= 𝑎𝑛𝑑 𝑣3=

a: Determine whether the set of vectors {𝑣1, 𝑣2, 𝑣3} is linearly independent or not.

b: Find a linear dependence relation among 𝑣1, 𝑣2, 𝑣3.

**Solution:**

**Part a)**

First, write the vectors in linear combination of x1, x2, and x3.

x1v1 + x2v2 + x3v3 = 0

Then,





Now, we need to make an augmented matrix from the above matrices.



Convert augmented matrix to row reduced echelon form.

~R1 R3



Now convert row reduced echelon form matrix into equations form

x1 + 2 x2 = 0

+x3 = 0

x = -2x2

So, x2 is a free variable

Let x2 = k

Then,

**x1 = -2k, x2 = k, x3 = 0**

Considering all these values, we can conclude that the given vectors are linearly dependent.

**Part b)**

Now put all these values in equation 1.

x1v1 + x2v2 + x3v3 = 0 equation(1)

-2kv1 + kv2 + 0v3 = 0

k(-2v1 + v2) = 0

-2v1 + v2 = 0

This is our final required relation between v1, v2 and v3.