

MAT0122 ÁLGEBRA LINEAR I

FOLHA DE SOLUÇÃO

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Assinatura

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Exercício: E8 (Problema 2.14.5 de PNK) **Data: 31/08/2022**

SOLUÇÃO

1. $\mathbf{u} = 0010010$

A subset whose sum is \mathbf{u} is $\{\mathbf{c}, \mathbf{d}\}$, since:

$$c + d = 0011100 + 0001110 = 0010010 = u$$

2. $\mathbf{u} = 0100010$

Suppose there is a valid subset.

This is a table for all 7-vectors:

	7	6	5	4	3	2	1
a	1	1	1	0	0	0	0
b	0	1	1	1	0	0	0
c	0	0	1	1	1	0	0
d	0	0	0	1	1	1	0
e	0	0	0	0	1	1	1
f	0	0	0	0	0	1	1
u	0	1	0	0	0	1	0

Regarding bit 7, we can reject vector **a**, since there are no other vectors whose sum with **a** could result in a most significant bit 0, such as **u**. We are left with $\{\mathbf{b}, \mathbf{c}, \mathbf{d}, \mathbf{e}, \mathbf{f}\}$.

Regarding bit 6, we need vector **b** for the sum of the sixth bit to be 1. We are left with $\{\mathbf{b}^1, \mathbf{c}, \mathbf{d}, \mathbf{e}, \mathbf{f}\}$.

Regarding bit 5, we need vector **c** for the sum of the fifth bit to be 1 (fifth bit of **b** + fifth bit of **c**). We are left with $\{\mathbf{b}, \mathbf{c}, \mathbf{d}, \mathbf{e}, \mathbf{f}\}$.

Regarding bit 4, we cannot have vector **d**, since the sum of the fourth bit would be 1 and it has to be 0. We are left with $\{\mathbf{b}, \mathbf{c}, \mathbf{e}, \mathbf{f}\}$.

Regarding bit 3, we need vector **e** for the sum of the third bit to be 0. We are left with $\{\mathbf{b}, \mathbf{c}, \mathbf{e}, \mathbf{f}\}$.

¹obs.: the italicized vectors inside the set are the essential ones.

Regarding bit 2, we cannot have vector \mathbf{f} , since the sum of the second bit would be 0 and it has to be 1.

We are left with $\{b, c, e\}$.

By making the addition

$$b + c + e = 010001\mathbf{1}$$

we are left with a vector **not** equal to \mathbf{u} . This makes our initial assumption wrong.

Therefore, such subset does not exist.