

Algoritmi e Linguaggi per Bioinformatica (a.a. 2014/2015)

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Homework on ultrametric and additive matrices 20 May 2015

1. **Ultrametric matrices.** Which of the following matrices is an ultrametric? (One is, one is not.) Prove both statements! (*Dimostra entrambe le affermazioni!*)

	a	b	c	d
a	0	6	2	12
b		0	6	12
c			0	12
d				0

	a	b	c	d
a	0	6	6	12
b		0	2	6
c			0	12
d				0

2. **Additive matrices.** Which of the following matrices is additive? (One is, one is not.) Prove both statements! (*Dimostra entrambe le affermazioni!*)

	a	b	c	d	e
a	0	5	10	11	10
b		0	11	10	9
c			0	9	8
d				0	5
e					0

	a	b	c	d	e
a	0	5	12	11	10
b		0	11	10	9
c			0	9	8
d				0	5
e					0

Note: You do not need to check whether the matrices define a metric, i.e. you do not need to check that they are positive definite, symmetric and fulfil the triangle inequality. You only need to check whether they fulfil the 3-point-condition (for 1.) resp. the 4-point-condition (for 2.).