

Intensive computation

Prof. A. Massini

Exam – July 20, 2016

Part A

- **Student's Name** -

- **Matricola number** -

Exercise 1 (5 points)	
Question 1 (6 points)	
Question 2 (5 points)	
Exercise 2 (5 points)	
Question 3 (5 points)	
Exercise 3 (6 points)	
Total (32 points)	

Exercise 1 (5 points) - Sparse matrices

Consider the sparse matrix 10x10 here below

0,608806	0	0	0	-0,3044	0	0	0	0	0
0	15080,45	0	0	0	-7540,22	94,2528	0	0	0
0	0	3,14176	0	0	-94,2528	0,78544	0	0	0
0	0	0	12566400	0	0	0	-6283200	0	0
-0,3044	0	0	0	0,608806	0	0	0	-0,3044	0
0	-7540,22	-94,2528	0	0	15080,45	0	0	0	-7540,22
0	94,2528	0,78544	0	0	0	3,14176	0	0	-94,2528
0	0	0	-6283200	0	0	0	12566400	0	0
0	0	0	0	-0,3044	0	0	0	0,608806	0
0	0	0	0	0	-7540,22	-94,2528	0	0	15080,45

a) Show its Skyline representation (using symbolic names m_{ij} for nonzero elements) .

b) Show the Skyline representation after cancellation of element $m_{8,4}$ and its symmetric

c) Show the Skyline representation after the insertion of element $m_{9,3}$ and its symmetric

Exercise 3 (6 points) - Linear systems

Solve the system

$$\begin{cases} 9x_1 + x_2 + x_3 = 1 \\ 2x_1 + 10x_2 + 3x_3 = 2 \\ 3x_1 + 4x_2 + 11x_3 = -1 \end{cases}$$

with Jacobi's Method using $\mathbf{x}^{(0)} = (0, 0, 0)$ as starting solution.

Complete the table below, doing three iterations.

k	$x_1^{(k)}$	$x_2^{(k)}$	$x_3^{(k)}$
0	0	0	0
1			
2			
3			

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Part B

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Exercise 1 (4 points)	
Exercise 2 (4 points)	
Exercise 3 (4 points)	
Exercise 4 (5 points)	
Question 1 (5 points)	
Question 2 (5 points)	
Question 3 (5 points)	
Total (32 points)	

