

# Intensive computation

Prof. A. Massini

Midterm Exam – April 17, 2019

- Student's Name -

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- *Matricola* number -

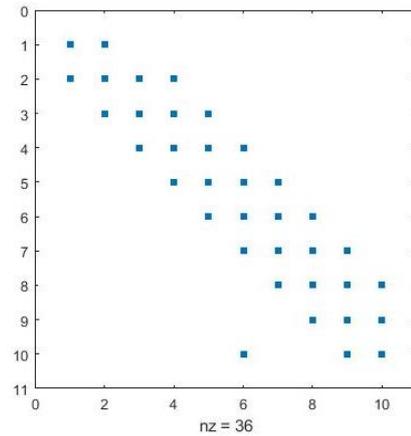
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|-----------------------|--|
| Exercise 1 (6 points) |  |
| Question 1 (4 points) |  |
| Question 2 (4 points) |  |
| Question 3 (2 points) |  |
| Exercise 2 (6 points) |  |
| Exercise 3 (3 points) |  |
| Question 4 (3 points) |  |
| Question 5 (4 points) |  |
| Total (32 points)     |  |

**Exercise 1 (6 points)**

a) Consider the sparse matrix here below, whose pattern is shown on the right.

|    | 1       | 2       | 3       | 4       | 5       | 6       | 7       | 8       | 9       | 10      |
|----|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1  | -6,4000 | 1,6000  | 0,0000  | 0,0000  | 0,0000  | 0,0000  | 0,0000  | 0,0000  | 0,0000  | 0,0000  |
| 2  | 1,6016  | -6,4125 | 1,5795  | 0,0018  | 0,0000  | 0,0000  | 0,0000  | 0,0000  | 0,0000  | 0,0000  |
| 3  | 0,0000  | 1,6044  | -6,4389 | 1,5585  | 0,0045  | 0,0000  | 0,0000  | 0,0000  | 0,0000  | 0,0000  |
| 4  | 0,0000  | 0,0000  | 1,6061  | -6,4622 | 1,5541  | 0,0055  | 0,0000  | 0,0000  | 0,0000  | 0,0000  |
| 5  | 0,0000  | 0,0000  | 0,0000  | 1,6063  | -6,4748 | 1,5608  | 0,0051  | 0,0000  | 0,0000  | 0,0000  |
| 6  | 0,0000  | 0,0000  | 0,0000  | 0,0000  | 1,6052  | -6,4740 | 1,5723  | 0,0038  | 0,0000  | 0,0000  |
| 7  | 0,0000  | 0,0000  | 0,0000  | 0,0000  | 0,0000  | 1,6035  | -6,4614 | 1,5838  | 0,0023  | 0,0000  |
| 8  | 0,0000  | 0,0000  | 0,0000  | 0,0000  | 0,0000  | 0,0000  | 1,6018  | -6,4418 | 1,5926  | 0,0011  |
| 9  | 0,0000  | 0,0000  | 0,0000  | 0,0000  | 0,0000  | 0,0000  | 0,0000  | 1,6006  | -6,4212 | 1,5977  |
| 10 | 0,0000  | 0,0000  | 0,0000  | 0,0000  | 0,0000  | 0,0012  | 0,0000  | 0,0000  | 1,6000  | -6,4057 |



Specify which arrays you need for the following compressed representations and how many bytes they occupy in memory.

**Skyline**

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**Diagonal**

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**Ellpack-Itpack**

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