Intensive computation

Prof. A. Massini

Second Midterm Exam – May 31, 2016

- Student's Name -
 - <i>Matricola</i> number -

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

Question 1 (4 points) F	Question 1 (4 points) Errors	
Give the definition of F	forward error and Backward error and explain what the Backward analysis is.	
a) Given y'=1,7 as the relative backward of absolute forward error		
<i>relative</i> forward error		
<i>absolute</i> backward erro	or	
<i>relative</i> backward erro	r	
1) 6		
b) Compute the value	e of the condition number.	
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Question 2 (5 points) Eigenvalues and eigenvectors

Explain how the Power Method works. Discuss the problems you can encounter when applying the Power method.				
Question 3 (3 points) Molecular dynamics				
Briefly describe the difference between the Hard sphere approach and the Differential equation approaches (Hooke law and Lennard-Jones)				

Question 4 (4 points) Methods for differential equations

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Exercise 2 (5 points) Methods for differential equations

Consider the initial value problem

$$y' = -2y + 2 - e^{-4t}$$
 $y(0) = 1$

Use Euler's Method for three iterations (e.g compute the approximation y_3) with a step size of h = 0.1 to find approximate values of the solution at t = 0.1.

Compare y_3 to the exact value of the solution giving the percentage error.

(The exact solution is: $y(t) = 1 + \frac{1}{2}e^{-4t} - \frac{1}{2}e^{-2t}$)					

Question 5 (5 points) Global optimization and Simulated Annealing Briefly describe the scheme of the Simulated annealing heuristic for global optimization problems. Write the pseudocode of the algorithm.

Question 6 (2 points) Simulation Briefly describe the time-advance mechanisms in simulation.