University of Potsdam
Institute for Physics and Astronomy

Assignment No. 1
Handed out on: 11/04/2014

Digital Image Processing in Astronomy

Please write your results in a textfile or m-file and send it to me by e-mail at the latest on 28/04/2014. Group work is permitted but text and programs should be written by yourself.

Exercise 1: *Matlab*

Write a short essay. What is MATLAB? What is the purpose of MATLAB? Which functions and procedures does it offer? Please, introduce yourself to the programme and its control elements. What are the functions of the different windows?

Exercise 2: *Matrices*

Check out the tutorial[1] and solve the following:

(a) Create an array with random numbers.

(b) Calculate the determinant, rank, dimension, maximum and minimum value of a matrix.

(c) Solve the following system of linear equations using matrices in MATLAB and explain it briefly.

$$2x + 5y - 9z + 3t = 151$$
$$5x + 6y - 4z + 2t = 103$$
$$3x - 4y + 2z + 7t = 16$$
$$11x + 7y + 4z - 8t = -32$$

(d) Calculate the volume and surface area of a sphere with radius $r = 15$, as well as radius and area of a circle with circumference $U = 128$.

Exercise 3: *Plotting in MATLAB*

Plot the following functions and their first derivatives in the same diagram.

(a) $7x^3 + 5x^2 - 10$

(b) $3\ln(x) - 4\exp(x)$

(c) $5x + \sin(x) + 9\cos(x)$

Additional Task: Label the axes in the third plot with physical quantities of your choice.

For questions or problems with the exercise, contact us at:

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[1] www.mathworks.de/academia/student_center/tutorials/launchpad.html