Tartalomjegyzék

Exercises

Introduction

Some exercises to get used to numpy

1. Make a vector of length 10 with elements all zero! Then modify its 4th element to 1 *(zeros)*
2. Make a 3-by-3 matrix with elements ranging from 0 up to 8 *(reshape)*
3. Make a random vector of length 30 containing random number between 0 to 1! Calculate its average and standard deviation! *(rand, mean, std)*
    1. Make a random vector of the same length with elements between -3 and 2!
4. Make a random unit vector in 5 dimensions! First make a random vector in 5 dimensions and then normalize it to unit length!

Monte-Carlo

Generate 500000 random points in the rectangle $[0, 2] \times [0, 4]$. Count how many of the points (*x*,*y*) have the property that $x^2 > y$. Use this to approximate the integral $\int_0^2 x^2 dx$ Like in the end of the lecture.

Sorting Lambda

Write a Python program to sort a list of tuples using Lambda. Original list of tuples:

```
[('English', 88), ('Science', 90), ('Maths', 97), ('Social sciences', 82)]
```

Sorting the List of Tuples:

```
[('Social sciences', 82), ('English', 88), ('Science', 90), ('Maths', 97)]
```

Lambda Selection

Write a Python program to filter a list of integers using Lambda. Original list of integers:

```
[1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
```

Even numbers from the said list:

```
[2, 4, 6, 8, 10]
```

Odd numbers from the said list:

```
[1, 3, 5, 7, 9]
```

Map Triples

Write a Python program to triple all numbers of a given list of integers. Use Python map.

Homework 9

Each problem counts for 3 points

Numeric integral

Estimate the integral of e^{-x^2} on the interval $[-2,5]$ with the left Riemann sum!

Numeric derivative

Plot the function sin(x) and its derivative on the interval [− ,]. Calculate the derivative with finite difference method!