



Introduction to Computers (IDC101)

Academic Session 2018-19

Lab Session - 06

October 01-05, 2018

1. Import numpy as np. Try `np.arange(n)`, `.shape`, `.reshape(r,s)`, `.ndim`, `np.zeros(r,s)`, `np.ones(r,s)`, `.linspace(a, b, n)`, `np.eye(n)`, `.min()`, `.max()`.
2. Write a function `randvect(n)` that returns a one dimensional array of size n , whose entries are random numbers between 0 and 1. Use your plotting skills to guess if these entries follow a uniform distribution, as n increases.
3. Write a function `toss(p)` that simulates a coin toss. That is, it returns H with probability p and T with probability $1 - p$. Now, n such coins are tossed and for $r \leq n$ the integer $P(r)$ denotes the number of coins where H appears. Estimate $P(r)$ by conducting this experiment 10000 times.
4. A magic square with row/column sum n is a square matrix with integer entries whose each row and column adds up to n . Write a program to check if a given matrix is a magic square.
5. Let $A(n, r)$ denote an $n \times n$ matrix whose first row is $0, 1^r, 2^r, \dots, (n-1)^r$, the second row is $n^r, (n+1)^r, (n+2)^r, (2n-1)^r$, and so on. Write a function that returns $A(n, r)$ for given n and r . For various values of n and r , plot n vs determinant of $A(n, r)$. Also plot n vs trace of $A(n, 1)$.
6. Write a program that solves a given linear system of equations for x, y and z ,

$$a_{11}x + a_{12}y + a_{13}z = b_1$$

$$a_{21}x + a_{22}y + a_{23}z = b_2$$

$$a_{31}x + a_{32}y + a_{33}z = b_3$$

where a_{ij} and b_k are real numbers.
