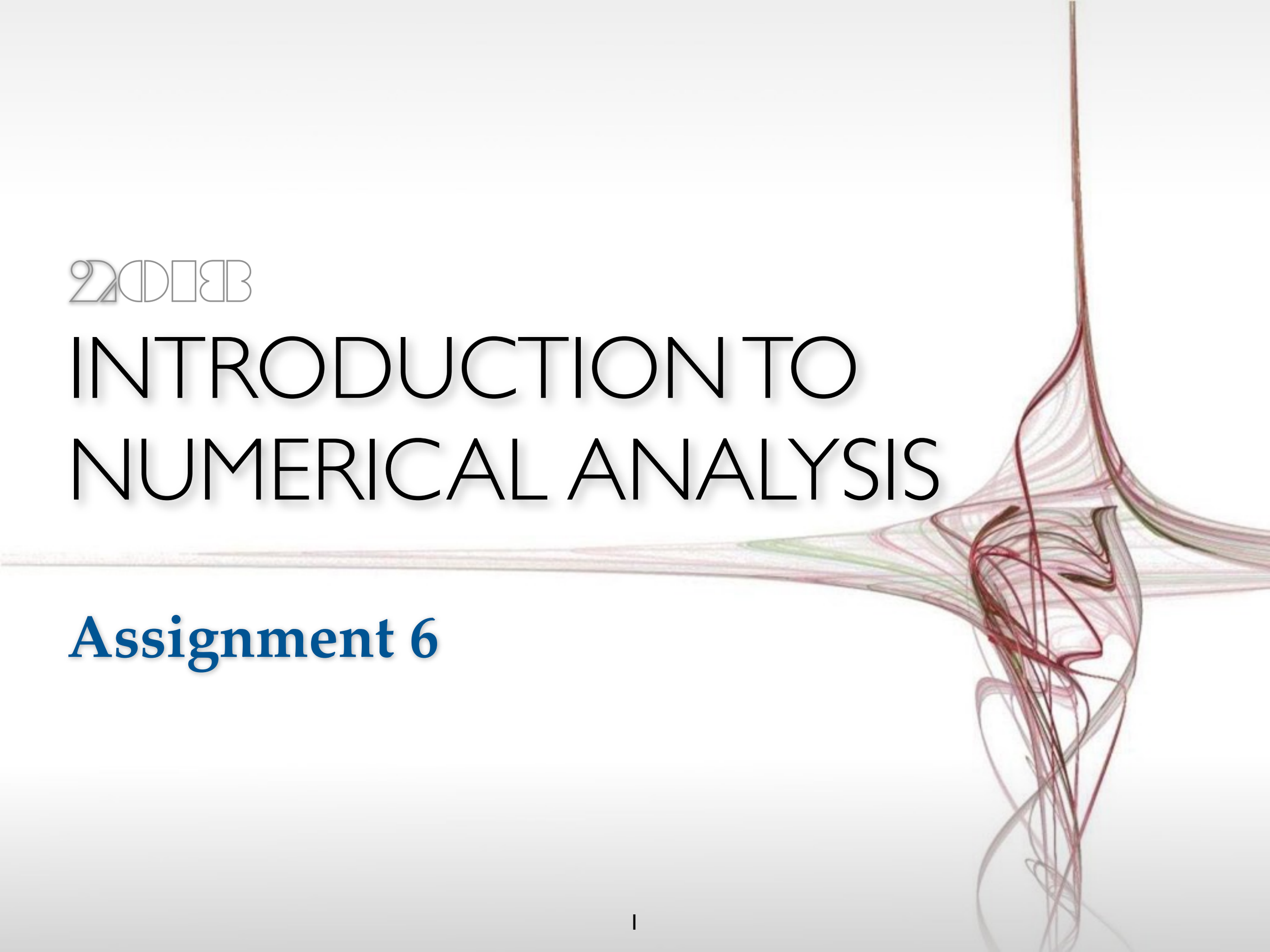
2018

INTRODUCTION TO NUMERICAL ANALYSIS



Assignment 6

ASSIGNMENT 6-1

Generate the target distribution

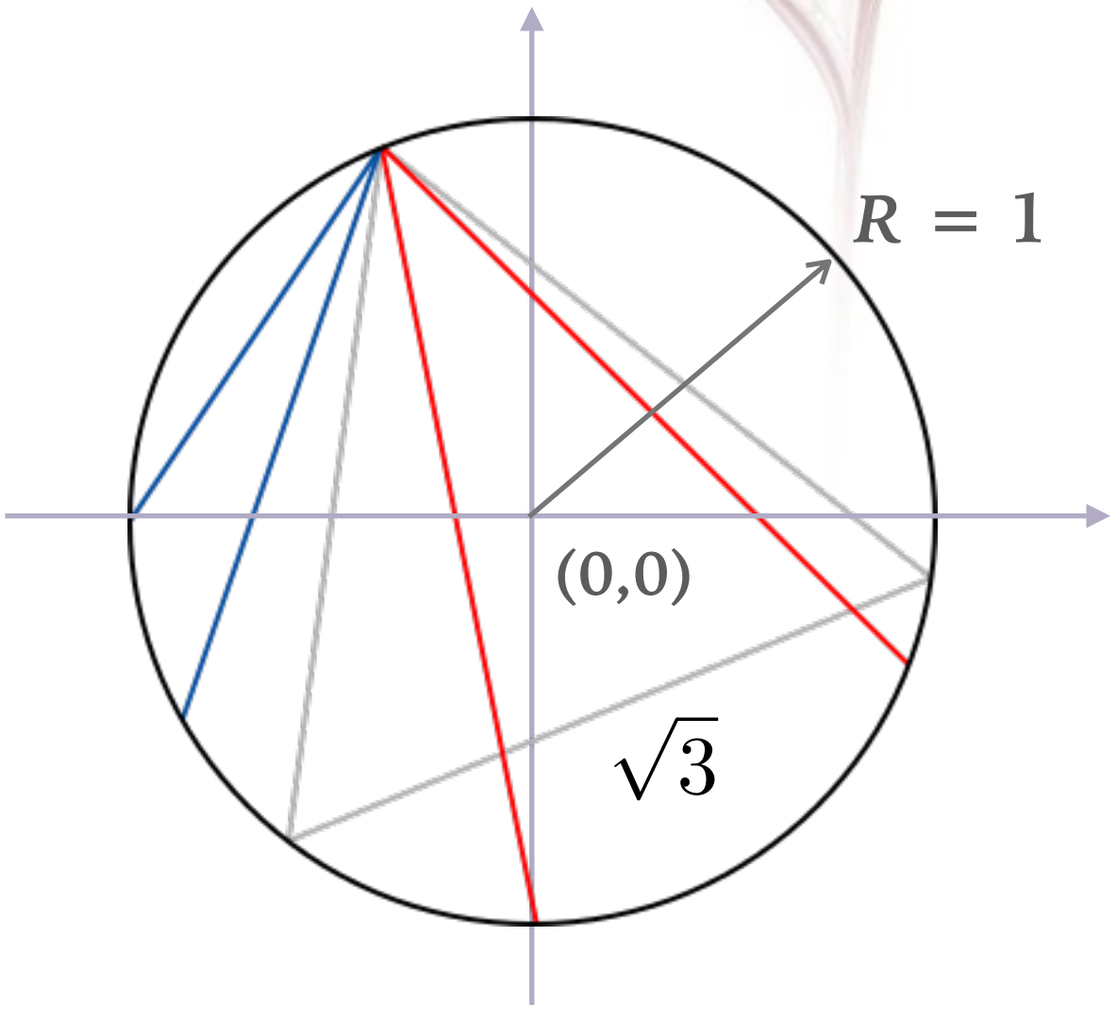
- Construct a function which takes the following two parameters as the arguments: ***N***, ***a***, ***b*** (where ***a,b>0***, and ***b>a***). The function should return a NumPy array of shape **(*N*,)** and filled with ***N*** random numbers ***x*** generated according to the following function within the boundary of **[*a*, *b*]**:

$$f(x) = \frac{1}{1+x}$$

ASSIGNMENT 6-2

Random chords

- Consider a circle, centered at (0,0) with radius 1. Randomly choose two points on the circumference of the circle and calculate the distance between them. Construct a function which takes only an argument ***N***, and it should return a NumPy array of shape **(*N*,)** and filled with the length of the ***N*** chords constructed with the method above. Note 1/3 of the chords should longer than 1.732!



ASSIGNMENT 6-3

"Smeared" Exponential

- Let's produce a "smeared" exponential distribution with the following steps:
  - Generate a random variable x according to the typical exponential distribution:
$$f(x) \propto \exp(-x/1.6)$$
  - Generate another random variable y according to a Gaussian distribution:
$$f(y) \propto \exp\left[-0.5\left(\frac{y-x}{0.2}\right)^2\right]$$
  - Repeat the steps above.
- Construct a function which takes only an argument ***N***, and it should return a NumPy array of shape **(*N*,)** and filled with random number ***y*** generated with the method above.