

# Lab 2

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## 1 Non-Uniform Random Number Generation

Accept-reject method

Generate uniformly distributed random numbers, while rejecting those lying outside of the distribution. Suppose random numbers are to be generated such that  $f(x) = 2x$  for  $x \in [0, 6)$

Inverse Transform Method

Find and apply an algebraic expression to uniformly distributed random numbers to convert them to produce random numbers distributed following a desired distribution. You will need the probability distribution function you want the random numbers to follow and a uniform random number  $u \in [0, 1]$ .

*Example :*

Determine the cdf from the pdf :

$$f(x) = \lambda e^{-\lambda x} \tag{1}$$

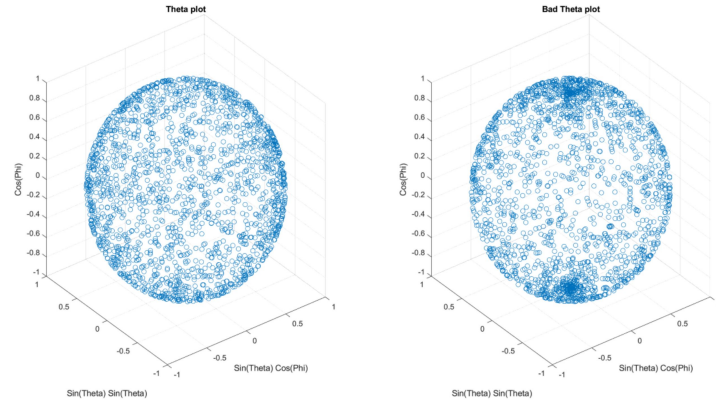
## 2 QUESTIONS

1/ Generate points on a sphere of radius 1 using the accept/reject method contrasting distributions uniformly between  $\phi \in [0, 2\pi]$  and  $\theta \in [0, \pi]$  for the following probability density function :

$$f(\theta) = A \sin(\theta)$$

Contrast the result to when  $\theta$  and  $\phi$  are  $[0, \pi]$ .

*Contrasted data should look like this :*



2 Use *Accept/Reject* method according to the following function :  
 $f(x) = \frac{10x^2}{32} + 17/(2)$  for  $x \in [-6, 10]$   
 using random numbers uniformly generated on the interval  $[0, 1]$ .