Stochastic Processes First Exam

**(15 points)**

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1. **(4 points)**Given Z distributed with , where is a gaussian normal random variable with pdf:

Taking into account that :

Find the moment-generating function for

Hint: For moment-generating function, the limits of integral is defined from minus infinity to infinity.

1. **(3 points)**A dice is rolled 1000 times. Calculate the expected sum of the 1000 rolls.
2. **(3 points)**A player of games throws simultaneously a dice and a coin. If the coin land tail, then the player wins twice, and if heads, the one-half of the value that appears on the dice. Build the pdf for the problem, and explain the expected value.
3. **(4 points)** Given an Earlang Ditribution as follows:

* **(1 points)** Find the Maximum Likelihood function and logLikelihood.
* **(1 points)** Plot the likelihood function and compare with loglikelihood.
* **(1 points)** Find the Maximum Likelihood Estimator for .
* **(1 points)** Explain the value parameter.

1. **(3 Additional points)** Choose one picture and calculate the invariant hu moments using R-Language. Explain each invariant Hu moment w.r.t selected picture and relationship between them.