

Sample Questions – 2

Q1.)

Generate a random sample of size 1000 from

- a.) log-Normal with $\mu = 5$ and $\sigma = 2.5$
- b.) Negative binomial with $k = 8$ and $p = 0.7$
- c.) Poisson with $\lambda = 1.35$
- d.) Gamma with $\alpha = 1.5$ and $\beta = 0.85$

using `set.seed(10221)`

Calculate the empirical quartiles and compare it with the true quartiles of the distribution and comment.

Q2.)

A study of educational levels of voters and their political party affiliations yielded following results:

Education	Party	
	A	B
SSC	40	20
Graduate +	30	35

Is party affiliation independent of education level?

Comment on the same using Chi-sq Test for Association and Fishers Exact Test.

Q3.)

Q4.)

Can we conclude if the following sample data comes from Poisson Distribution.

Use Chi-sq GoF test to confirm the same.

X	Frequency
0	739280
1	185309
2	23349
3	1937
4	114
5	1
6	3

Q4.)

Load the `Animals` dataset from `MASS` package.

Understand the 2 variables from the help section by executing the code

```
?MASS::Animals
```

- a.) Comment on the log relationship between the 2 variables.
- b.) Build a glm model for brain size with family = gamma and link = log
- c.) Comment on the summary of the model.
- d.) Calculate AIC of the model

Q5.)

Import the data: `Spam Email.csv`

You want to predict whether a given email is a Spam or not.

Every row represents an email and every column represents a word and its corresponding cell represents the no. of times that word has been used in an email.

Build a model to predict whether an email is Spam or not.

Try to create multiple models with different regressors and compare them based on AIC and Null Deviance.

Q6.)

In a very small empirical study a sample from a random variable X is observed. The data can be entered into R using the following code:

```
x =
```

```
c(0.22,0.38,1.28,0.54,0.56,1.36,0.55,0.37,0.43,0.46,0.62,0.54,0.54,0.51,0.44,0.68,0.55,0.30)
```

Assuming $X \sim \text{Normal}$.

Construct a confidence interval for the expected value of X using the bootstrap method with 10,000 bootstrap replications.

Q7.)

Practise Permutation Test from Unit 3.