Assignment : Math Bootcamp Preterm

Submission Deadline : 26 Apr 2020

*Essay based question (write in 500 words or less)*

Q1 How does linear algebra help you with data science? Explain with examples. Meaning, in absence of linear algebra why things would have been difficult?

Q2 Write down the definition of independent events, disjoint sets and mutual exclusivity. Are all independent events disjoint sets? Explain using an example.

Q3 Write about any business problem that you have found very unstructured and challenging. Now represent this problem in terms of function and explain what you need to optimize and by changing which variable. (Ex: Maximize profits/revenue by changing price)

*Solving questions*

Q4 If a function is continuous is it always differentiable? Give two examples.

Q5 Let X be the number of the cars being repaired at a repair shop. We have the following information:

At any time, there are at most 3 cars being repaired.
The probability of having 2 cars at the shop is the same as the probability of having one car.
The probability of having no car at the shop is the same as the probability of having 3 cars.
The probability of having 1 or 2 cars is half of the probability of having 0 or 3 cars.
Find the PMF of X.

Q6 Given any constants a,b,c where a≠0, find all values of x such that the matrix A is invertible if A is

$$A = \begin{matrix} 1 & 0 & c \\ 0 & a & -b \\ -1/a & x & x^2 \end{matrix}$$

Q7 Compute the determinant of the following matrix

$$A = \begin{matrix} 8 & 1 & 6 \\ 3 & 5 & 7 \\ 4 & 9 & 2 \end{matrix}$$

Q8 a) If two random variables are independent, does it mean the correlation between them is 0? Explain your answer

b) If two random variables are dependent, does it mean they are correlated? Explain your answer.