# Department of Data Science
# IIT Palakkad
## CS5007 : Deep Learning

**1200-1250** **Quiz 1 (24 Jan 2022)** **Marks : 10**

**Instructions**

1. Write your answers neatly in Blue/ Black ink. Do not use pencil / Red ink. If your answer is not legible, you will not get any marks for that.

2. Doubts and questions will not be answered during the exam. If you have to make any assumption about unspecified things, write the assumption clearly with justification.

3. Answer all parts of a question together. If the parts of a single question are not together, then only the first part will be evaluated. Other parts will not get any marks.

4. Write your name and ID number at the top of the answer sheet. Save the pdf with the following naming convention: [name]_dl22_quiz_1.pdf and upload to the designated assignment in LMS. Do not email.

5. Write question number clearly for each answer. Draw a line after the answer.

6. No hard or soft material are permitted for consultation during the exam.

7. There will be partial markings for the questions, so even if you are not able to solve the entire problem be sincere with the steps.

1. Consider the scenario of naive Bayes classifier. Assume that $x \in \mathcal{R}$ is input and $y \in \{0, 1\}$ is output. Suppose, training data is not given to you but you are given the sufficient statistics of the data. You have been told that $x$ is a Gaussian random variable in $\mathcal{R}$ with mean $\mu$ and variance $\sigma^2$. Can you write the the decision function of the naive Bayes classifier in this case ? If yes, then write the decision function by specifying the assumptions if you need to make any. If no, then explain the limitations. Note that, a decision function takes a data point as input and gives label as output. [Hint. Utilize the probability density function of Gaussian distribution.] (5)

2. Prove that for a suitable choice of parameters it is possible to converge to local optimum of a function using gradient descend given that local optimum exists for the function. [Hint. State gradient descend and relevant parameters. Show that it is possible to move closer to local optimum in every step. State your assumptions carefully. Define your convergence criterion.] (5)