

Quiz-1 Math of Network Algo. (16th Aug 2023)

Name:

Enroll. Nr. _____

- (4pt) Describe the following terms: (i) Perceptron, (ii) Activation function, (iii) Neural Network, and (iv) Loss Function.
- (6pt) Consider a function $f : \mathbb{R}^2 \mapsto \mathbb{R}^2$ defined as $f((x_1, x_2)) = (-2x_2, -3x_1 + x_2)$. Describe geometrical interpretation of the above function in terms translation matrix, mention how a random point is shifted, and special points that may be only stretched.
- (5pt) Consider a $n \times n$ matrix A . Prove that $\|A\|_F^2 = \text{Tr}(A \cdot A^T)$
- (4pt) We flip a fair coin ten times. Find the probability of the following events: (i) Nr of heads and tails are equal. (ii) Nr of heads is more than nr of tails. (iii) The i^{th} flip and $(11 - i)^{\text{th}}$ flip are same for every $i \in [5]$.
- (6pt) We roll two fair dice. What is the probability space? What is the expectation of random variable representing the sum of two dice?
- (5pt) Write steps in Principal Component Analysis to reduce 2-dimension data to 1-dimension data.