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TEST -1 EXAMINATION

September 2018

B.Tech. 7th Semester (ECE)

Course Code: 18B1WEC733

MAX. MARKS: 15

Course Name: Machine Learning & Data Analytics-I

Course Credits: 04

MAX. TIME: 1 hr

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

- Q1. A second hand car dealer has 10 cars for sale. He decides to investigate the link between the ages of cars, x years, and mileage, y thousands miles. The data collected from the cars are shown in the table below: [3] [CO3,CO4]

Age x years	2	2.5	3	4	4.5	4.5	5	3	6	6.5
Mileage y thousands miles	22	34	33	37	40	45	49	30	58	58

- (a) Find the equation of the least square regression line in the form $y = a + bx$.
(b) Using your answer to part (a), find the mileage predicted by the regression line for a 5 year old car.
- Q2. The given data are a study of depression & was a longitudinal study. The purpose of study was to obtain estimates of the prevalence and incidence of depression and to explore its risk factors. [3] [CO3,CO4]

Regular Drinker	Sex		Total
	Female	Male	
Yes	139	95	234
No	44	16	60
Total	183	111	394

- (a) What are the odds that a woman is a regular drinker?
(b) What are the odds that a man is a regular drinker?
(c) Compared to a man, what is the relative odds (odds ratio) that a woman is a regular drinker?
- Q3. The polynomial kernel is defined to be $k(x, y) = (x^T y + c)^d$ where $x, y \in \mathbb{R}^n$ & $c \geq 0$. When we take $d = 2$, this kernel is called the quadratic kernel. Find the feature mapping $\Phi(x)$ that corresponds to the quadratic kernel. [3] [CO1,CO3]
- Q4. Derive least mean square algorithm's update rule:
$$\beta_i := \beta_i + \alpha(y_i - f(x_i))x_{ij}$$
 [3] [CO1,CO3]
- Q5. (a) What are the differences between Logistic Regression and Discriminant analysis? [3]
(b) Write linear score function equation for Linear Discriminant analysis. [CO1,CO2]
(c) Explain Principal Component Analysis. How to standardize variables before PCA.