# Instructions - Quiz 1

- Two questions 15 minutes each

- You are given a single sheet of paper
- Write your name and roll number

- Solve Q1 in the first page
- Solve Q2 in the second page [Do not exceed one page for each question]

# Question 1: 15 min, 4 marks, Page 1

Q1: Let the loss function be

$$L(w) = \frac{1}{2}(y - Xw)^T(y - Xw) + \lambda w^T w$$

where $y$ is $N \times 1$ dim, $w$ is $(D+1)$ dim

$X$ is $N \times (D+1)$ dim

& $\lambda$ is a constant (e.g. $\lambda = 0.5$)

Solve for $w_{opt}$ using closed form vector differentiation

# Question 2: 15 min, 6 marks, Page 2

Q2: Given a logistic regression model for a CAT vs DOG binary classification problem

define the cross-entropy loss (NOT MLE) and derive gradient descent equation to update a, b and c

$$P(\text{CAT} \mid \begin{bmatrix} x \\ z \end{bmatrix}; \begin{bmatrix} a \\ b \\ c \end{bmatrix}) = \sigma(a + bx + cz)$$

x & z are features