

## Machine Learning

1. Given a dataset of housing prices and the square footage of the houses, build a linear regression model to predict the price of a house based on its square footage.

Square Footage (sqft)	Price (\$)
1000	200000
1200	250000
1400	300000
1600	350000
1800	400000
2000	450000
2250	500000
2500	550000
2750	600000
3000	650000
3250	700000
3500	750000
3750	800000
4000	850000
4250	900000
4500	950000
4750	1000000
5000	1050000
5250	1100000
5500	1150000
5750	1200000
6000	1250000
6250	1300000
6500	1350000
6750	1400000
7000	1450000
7250	1500000
7500	1550000
7750	1600000
8000	1650000

- a) By using the numpy and matplotlib library in Python to implement linear regression.
- b) By using the scikit-learn library in Python to implement linear regression.

2. a)

Consider the data given in the below table. Reduce the dimension from 2 to 1 using the principal Component Analysis algorithm. Also, Project the data points on the axis of the first principal component.

X1	X2
4	11
8	4
13	5
7	14

**NOTE:** Show all the steps in your solution

b) By using the numpy library in Python to implement the PCA algorithm using above dataset and print projected reduced dataset.

#### Web Technology Part

### Question:

Write an HTML code to create a **registration form** with the following fields and implement JavaScript validation for each input:

#### Form Fields:

1. **Name** (Text field) – Should only contain alphabets and spaces.
2. **Email** (Email field) – Must be a valid email format (e.g., example@email.com).
3. **Password** (Password field) – Must be at least 8 characters long and include at least one uppercase letter, one lowercase letter, and one number.
4. **Confirm Password** (Password field) – Must match the password field.
5. **Phone Number** (Text field) – Must be exactly 10 digits.
6. **Date of Birth** (Date field) – Cannot be left empty.
7. **Age** (Number field) – Must be between 18 and 100.
8. **Gender** (Radio buttons) – User must select either Male or Female.
9. **Country** (Dropdown menu) – User must select a country from predefined options (e.g., USA, Canada, UK).
10. Clear and Submit Buttons

#### JavaScript Validation Requirements:

- Display appropriate error messages in red if any validation fails.
- Prevent form submission if any field is invalid.
- Show an alert message "**Form submitted successfully!**" when all fields are correctly filled.

Implement the **HTML, CSS, and JavaScript** to create and validate the form as per the above conditions.