

# Point Cloud Learning Assignment (Day 16–18)

## Q1. DBSCAN Clustering and Noise Detection

- Load your .pcd file in Open3D
- Apply DBSCAN using:

```
labels = np.array(pcd.cluster_dbscan(eps=0.2, min_points=10))
```

- Color each cluster differently; color noise (label = -1) black
- Submit:
  - a. Screenshot of the clustered point cloud
  - b. Print: total number of clusters and noise points

## Q2. Cluster Bounding Boxes: AABB & OBB

- Select any one labeled cluster from DBSCAN
- Compute both:
  - a. AABB (Axis-Aligned Bounding Box) – Red
  - b. OBB (Oriented Bounding Box) – Green
- Use :

```
aabb = cluster.get_axis_aligned_bounding_box()
obb = cluster.get_oriented_bounding_box()
```
- Submit:
  - a. Screenshot with both boxes visible
  - b. Mention cluster ID used

## Q3. Euclidean Distance Between Two Points

- Pick any 2 points from the point cloud
- Calculate the straight-line distance using:

`dist = np.linalg.norm(p1 - p2)`

- Submit:
  - a. Code and distance printed
  - b. Screenshot (if possible) indicating selected points

#### **Q4. Plane Fitting and Point-to-Plane Distance**

- Detect the ground plane using `segment_plane()`
- Print the plane equation (A, B, C, D)
- Pick one point and compute its perpendicular distance to the plane
- Submit:
  - a. Printed equation and distance
  - b. Screenshot highlighting plane vs other points

#### **Q5. Visualize Plane (Green) vs Outliers (Red)**

- Separate the plane inliers and the rest of the cloud
- Color the plane green, rest red
- Display both using `draw_geometries()`
- Submit:
  - a. Screenshot of the final visualization
  - b. Short note: what this shows