

Amit Divekar | Practical 4

Geometric Properties and Computations

```
In [1]: from sympy import Point, Segment, Triangle, Polygon, Line
import sympy as sp
```

Q1. Write a Python program using the SymPy library to find the midpoint and length of a line segment in a 2D plane. Two points A(2,4) and B(8,10)

```
In [2]: from sympy import Point, Segment
A = Point(2, 4)
B = Point(8, 10)
segment = Segment(A, B)
print("Midpoint:", segment.midpoint)
print("Length:", segment.length)
```

```
Midpoint: Point2D(5, 7)
Length: 6*sqrt(2)
```

Q2. Write a Python program to define a triangle in a 2D plane and compute its important geometrical properties. Three points (0,0), (6,0) and (3,4).

```
In [3]: from sympy import Point, Triangle
T = Triangle(Point(0, 0), Point(6, 0), Point(3, 4))
print("Area of triangle:", T.area)
print("Perimeter of triangle:", T.perimeter)
print("Centroid:", T.centroid)
```

```
Area of triangle: 12
Perimeter of triangle: 16
Centroid: Point2D(3, 4/3)
```

Q3. Write a Python program to define a polygon using the points (0,0), (4,0), (5,3) and (1,4)

```
In [4]: from sympy import Point, Polygon
P = Polygon(Point(0,0), Point(4,0), Point(5,3), Point(1,4))
print("Area of polygon:", P.area)
print("Centroid of polygon:", P.centroid)
```

Area of polygon: 29/2
Centroid of polygon: Point2D(70/29, 155/87)

Q4. Write a Python program using the SymPy library to find the point of intersection of two lines in a 2D plane.

```
In [5]: from sympy import Line, Point  
L1 = Line(Point(1, 2), Point(4, 6))  
L2 = Line(Point(1, 6), Point(4, 2))  
intersection = L1.intersection(L2)  
print("Point of intersection:", intersection)
```

Point of intersection: [Point2D(5/2, 4)]