Jahangirnagar University

Department of Computer Science and Engineering
3rd Year 1st Semester 2024
CSE 305 Computational Geometry
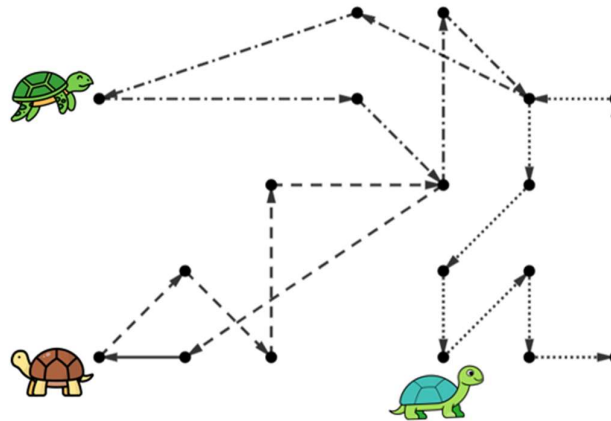**Class Test 1**
Duration: 45 minutes | **Full Marks:** 30

[Answer to the following questions. Answering all of them is mandatory. Figures in the right margin indicate marks.]

1. (a) **Define**: (i) Dot Product (ii) Cross Product   *3*
    (b) **Determine** whether the two-line segments AB and CD intersect with endpoints   *5*
        A(1.8, -1.8), B(1.2, 0.6), C(2.9, -1.7), and D(0.6, 1.4). If they do, compute the intersection point.
    (c) Consider the set of 2D points: (-6, -0.8), (-7.2, 0.4), (-5.2, -0.4), (-7.6, -0.8), (-4.8, 0.4),   *7*
        (-5.6, -1.6), (-6.4, -0.4), (-5.6, 0.8). **Illustrate** the step-by-step divide-and-conquer algorithm to find the minimum distance between any two points.

2. (a) **State** the Pick's theorem.   *3*
    (b) **Calculate** the number of lattice points inside or on the boundary of a polygon   *5*
        P = [(-4, -2), (-2, -2), (-1, -1), (-1,1), (-2, 2), (-4, 2), (-5, 1), (-5, -1)] where the points are given in counter clockwise order.
    (c) Three endangered tortoise species were tracked via GPS along a coastal area. See Figure   *7*
        below. Given a large set of their location points, design an efficient algorithm to compute the minimum perimeter enclosing their range for a protective zone.
        (i) **Design** the algorithm and analyze its complexity.
        (ii) **Discuss** edge cases.

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Good Luck!!!