Segment-7

Spring 2016

6.

a) Suppose that an ant is traveling from point A(2,1) to point B(6,4) in straight line, and from there it 3 started to travel towards point C(4,6). Did the ant turn to left or right at point B? From point C it travelled toward point D(2,8) What tum did the ant make at point C. left or right? Show using the technique of cross product. [Use the technique of cross product, (p1-p0) X (p2-p0) = (x1-x0) (y2-y0) -(x2-x0) (y1-y0)]

b) Graham's scan solves the convex bull problem by sorting the points by polar angle in counter clockwise. Suppose, you are given two points P_1(4.5) and P_2(2,3) Determine which one has greater polar angle.

c) Consider the following points and find the convex hull using Graham's scan algorithm[(2.0,2.0),(4.0,2.0),(0.5,2.5),(3.0,3.5),(1.0,4.0),(1.0,1.0),(0.0,4.0),(1.0,1.0) ,(3.0,2.5),(4.0,4.0),(3.5,1.5),(0.5,1.0)]

Autumn 2016

a) Given two rectangles whose edges are parallel to the axis. How can you determine whether these two rectangles intersect?
   OR given one line segment AB and a point C. How can you determine whether point C is on the line segment AB or not?
b) Show how the sign of the cross-product of two vectors can be used to determine whether one vector resides in clockwise or anti-clockwise direction with respect to another vector. Show using suitable figure.
c) Consider the following points and find the convex bull using Graham's scan algorithm [(4,4), (8,4), (4,8), (8,8), (6,6), (5,5), (6,8), (8,6)].

Autumn 2018

a) Write Down Graham's scan algorithm of convex hull construction.
b) Write down the algorithm to calculate x^n mod m.
c) Graham's scan solves the convex hull problem by sorting the point using pplar angle with respect to some point P_0 in counter clockwise. Suppose, you are given two points P_1 (4,5) and P_2 (2,3). Determine which one has greater polar angle with respect point P_0 (0,0).

Spring 2015

a) Describe the line segment properties. How can we determine if two lines are collinear?
b) Consider the following points and find the convex hull using Graham's scan algorithm [(2.0, 2.0), (4.0, 2.0), (0.5, 2.5), (3.0, 3.5), (1.0, 4.0), (0.0, 4.0), (1.0, 1.0), (3.0, 2.5), (4.0, 4.0), (3.5, 1.5), (0.5,1.0)]
c) Suppose that an ant is travelling from point A(2,1) to point B(6,4) in straight line, and from there it started to travel towards point C(4,6). Did the ant turn to left or right at point B? From point C it travelled toward point D(2,8). What turn did the ant make at pint C, left or right? Show using the technique of cross product. [Use the technique of cross product, (p1-p0) x (p2-p0)=(x1-x0)(y2-y0)-(x2-x)(y1-y0)].

Autumn 2015

a) Given one line segment AB and a point C. How can you determine whether point C is on the line segment AB or not?
b) Given two line segments AB and CD where coordinates of the points are A(2,2), B(5,3), C(4,6) and D(8,1). Find whether these two line segments intersect or not using the concept of cross product of two vectors Show all the calculations.
c) Consider the following points and find the convex hull using Graham's scan algorithm.
[(4,4), (8,4), (1,5), (6,7), (0,8), (2,2), (6,5), (8,8), (7,3), (1,2), (4,9), (3,6)]