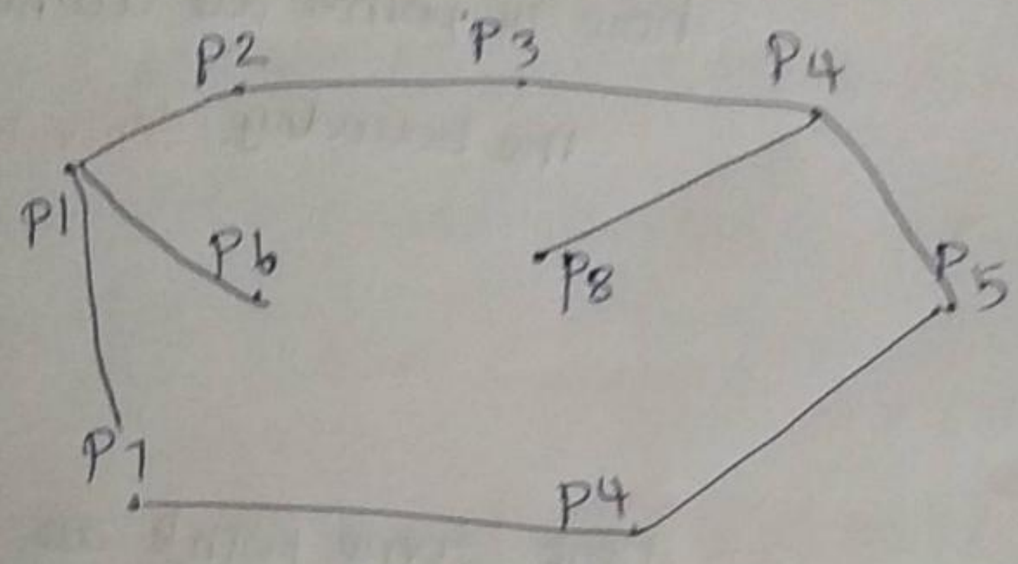
Convex Hull problem



-> to find the convex polygon set

->all points are either on boundary or within the polygon

=>n should be always greater than 3.

-> they should not be in colinear [——— x]

Convex set :-

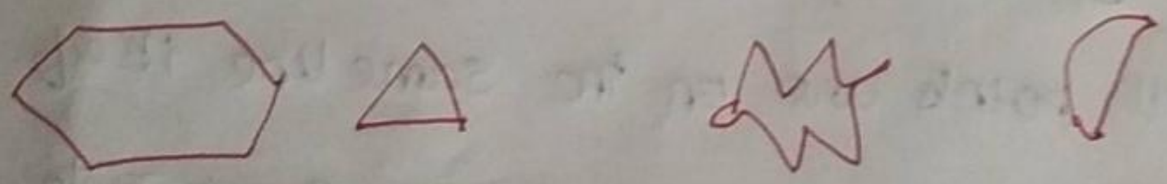
A set of points are to be called convex set, if any 2 pts p and q. the entire line segment ends with end points p and q. which belongs to the set.

points shld be in the set

Convex Hull :-

all points are in boundary or inside.

Eg :-

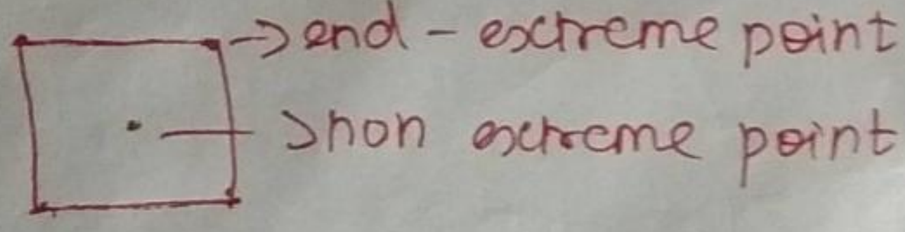


convex

non convex

Theorem :-

A convex hull of any set S, of $n \geq 3$, not all on the same line is a convex polygon, with vertices at some of the points of S.



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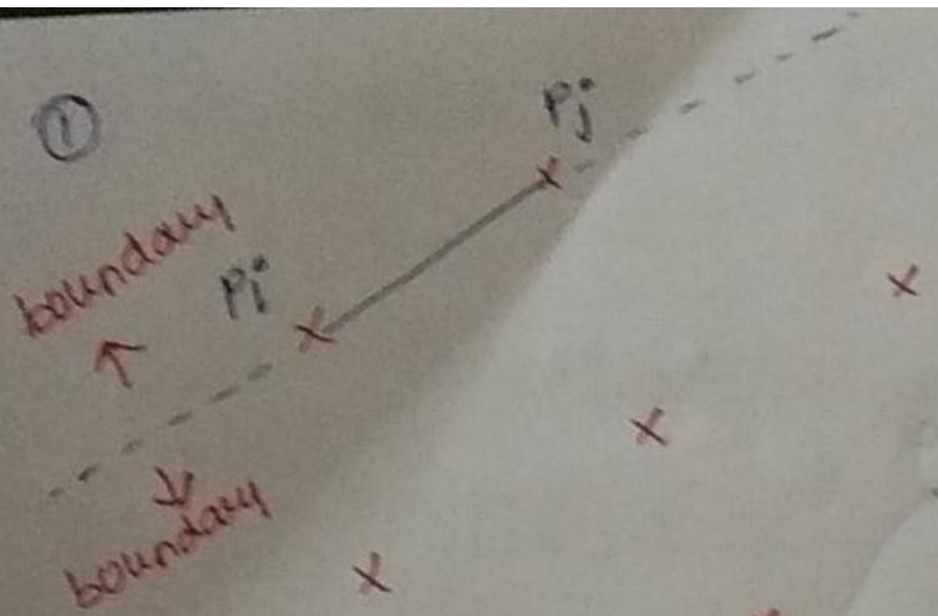
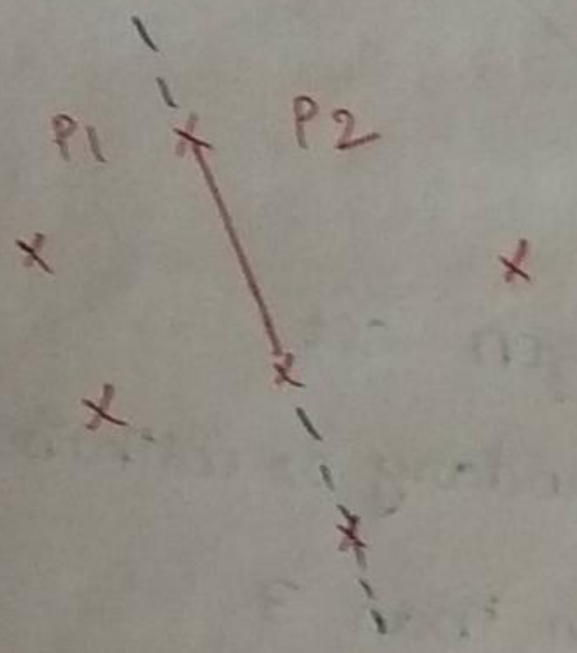
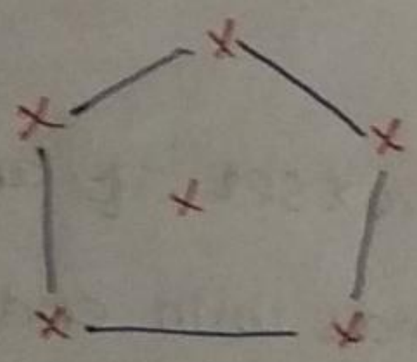


there all points are within the boundry. (either boundary



there some points are in the P1 and also in P_2.

continue above steps. we get last



Equation: $ax+by=c$

three cases $ax+by>3$, $ax+by<3$ or $ax+by=0$.

$a = y_2 - y_1$ $b = x_1 - x_2$ $c = x_1 y_2 - y_1 x_2$.

$ax+by=c$ - all points are on the same line itself.

To check whether certain points lie on same side of the line, we can check $ax+by-c$ has same sign.

Efficiency:

$O(n^3)$ by $n(n-1)/2$

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