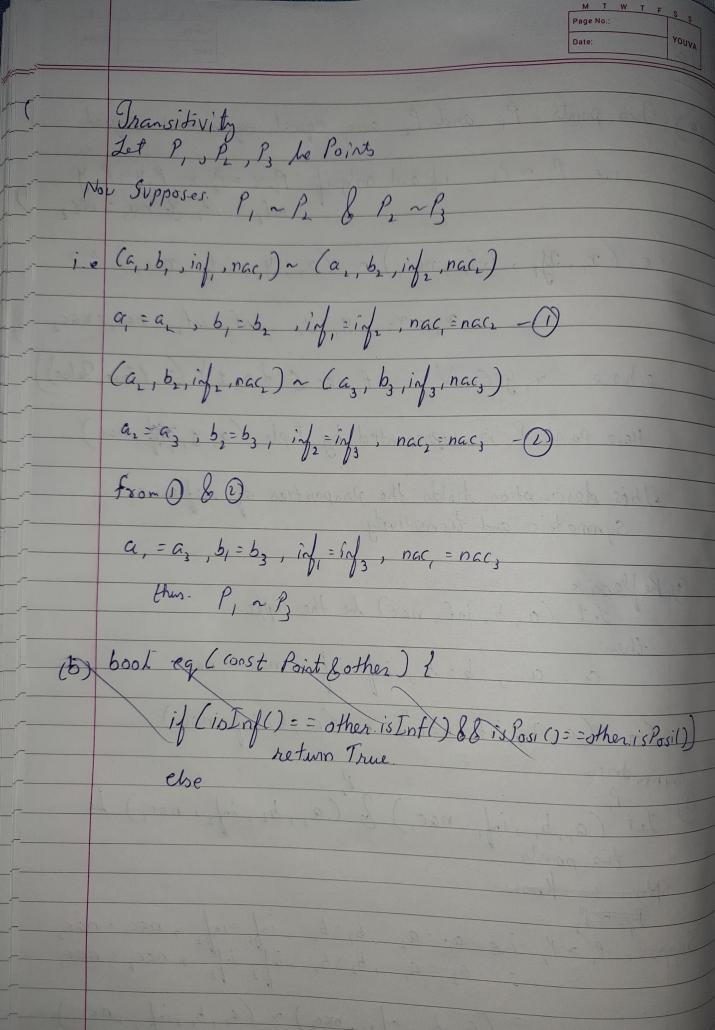
(a) Two points P, and P, are equal equivalent equal i.e P, ~ P, if and only if P, >c = P, x, P, y = P, y
inf, = inf, & nac, = nac, = i.e. $(x_1, y_1, inf, nac,) \sim (x_1; y_1, inf_2, nac_2) =)$ $x = x_2$, $y = y_2$, $inf_1 = inf_2$, $nac_1 = nac_2$ where x, y EN, inf, nac & do, 1 & C. ETrue, False) Here point P is represented by tuple (x, y, inf, nac) This description holds the properties of reflexive, Symmetric and transitivity. Preflessive.
Let (a, b, inf, nac) he the toppe a = a, b = b, inf = inf, nac = nac. 50. (a, b, inf, nac) a (a, b, inf, nac) Let (a, b, inf, nac,) & (a, b, inf, nac,) he

two points.

Now we know. Suppose f_1 $\sim f_2$ i.e $\alpha_1 = \alpha_2$, $b_1 = b_1$, inf = inf, $nac_1 = nac_2$ $= \alpha_2 = \alpha_1$, $b_1 = b_2$, inf = inf, $nac_1 = nac_1$

 $= (a_1, b_1, inf_2, nach) \sim (a_1, b_1, inf_1, nach)$ $= (a_2, b_1, inf_2, nach) \sim (a_1, b_1, inf_1, nach)$



(b) bool eq (const Point Sother)?

if (is Info)?

if (other is Inf () ! = true) return false;

if (is Posi() == other is Posi())
return true

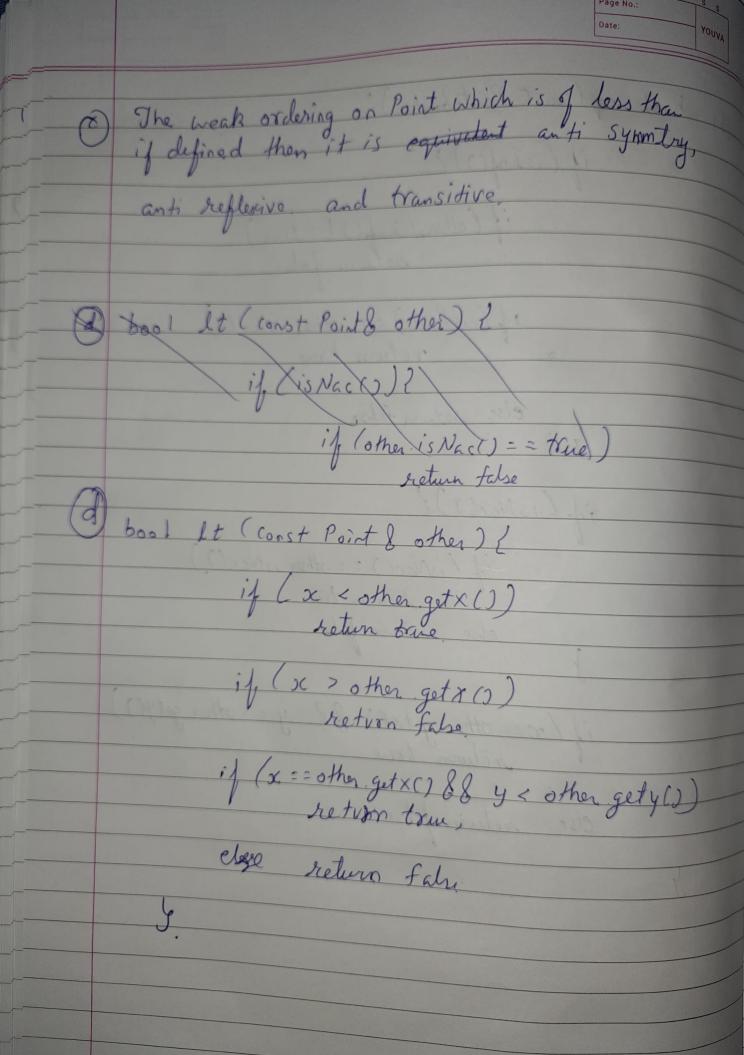
else return false

if (is Nac())?

if (isNac() = = other isNac()) return truse else return false

if (x == other get x() && y == other get y())
return true.

else return false



Here if a point is Inf and has x == 1 we return

Constant representing positive infinity. Csay const is INT_MAX)

if a point is Inf and has so := - 1 we return constant? representing negative infinity. (Say const is INT_MIN)

representing not a coordinate. We map it to

for normal point we multiple & coodinate with some large prime number and add y coordinate to it.

unsigned hash() {

if (is Inf() && getx() == 1)
return INIMAX

if (isInf() & & getX()==-1) return INT_MIN

if (isNac()) return 0;

unsigned hashio

hash V = 33 739 x Unsigned (x) + Unsigned (y)

return hashVi

Here 33739 is one prime number.

The above hash function defined hash following properties 1) Conputation is O(1) 1) It is deterministic - Always return integer which is some for each point on every call. 3) If to points P, & P, are Ignal, then, the hash calculated is also equal. if 2 positive isfinity taken then INT MAX is returned for both. it (1978 to 1982 para max hashir. 33 max happed (x) & resigned (p)