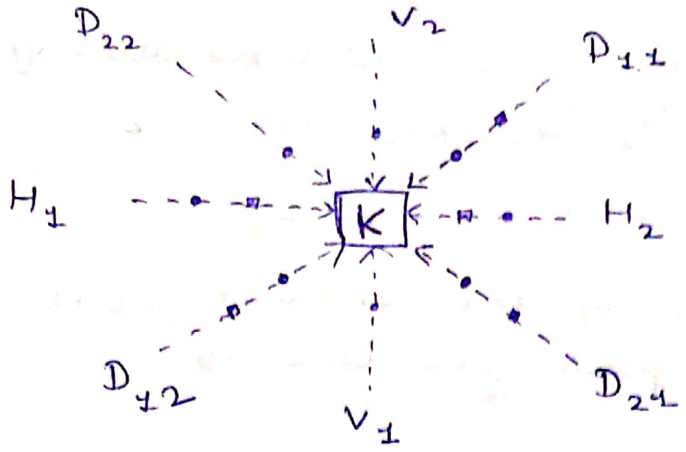
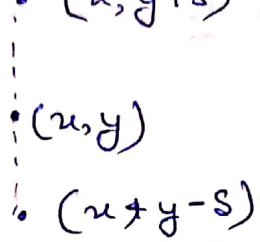
734 D Anton & Chess



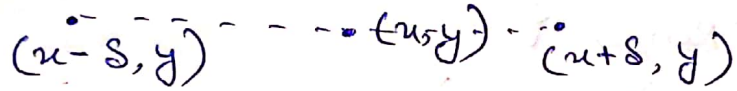
① Verticals



$y' = y_{R/Q} - y_K$

if $y' < 0$
→ piece is in V_1
else
→ piece is in V_2

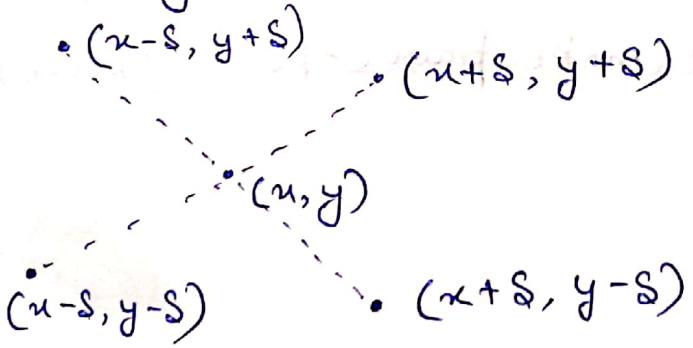
② Horizontals



$x' = x_{R/Q} - x_K$

if $x' < 0$
→ piece in H_1
else
→ piece in H_2

③ Diagonals



$m = \dfrac{y_{B/Q} - y_K}{x_{B/Q} - x_K}$

if $m == 1$
→ piece in D_1
if $x_{B/Q} - x_K < 0$
→ piece in D_{12}
else
→ piece in D_{11}

if $m == -1$
→ piece in D_2
if $x_{B/Q} - x_K < 0$
→ piece in D_{22}
else
→ piece in D_{21}

Algorithm

1. For each given point, classify it into belonging to either $V_1, V_2, H_1, H_2, D_{11}, D_{12}, D_{21}, D_{22}$.
2. Sort all the container $V_1, V_2 \ldots D_{22}$
3. If first piece of any of the container is eligible to check the King → print yes else no.

Time Complexity

$O(n + 8 \log m + 8) \rightarrow \Sigma m = n \cong O(n)$

Implementation

```
for each piece in pieces
    if !( x_piece == x_king || y_piece == y_king || abs((y_p - y_k)/(x_p - x_k)) == 1)
        continue;
    if (x_piece == x_king) {
        if (y_piece > y_king)
            s[1].insert(make_pair(dis(x_piece, y_piece), x_k, y_k));
        else
            s[2].insert(make_pair(dis(x_piece, y_piece), x_k, y_k))
    }
```