$$f(-k,k) = (2k+1)^2, \qquad k = 0,1,2... \tag{1}$$
$$f(k,-(k-1)) = (2k)^2, \qquad k = 1,2... \tag{2}$$

$N = maxAbs$
$f(r,c) = f(-N,N) - (N-c), \qquad r = -N, r < c$
$f(r,c) = f(-(N-1),(N-1)) + (r+(N-1)) + 1, \qquad c = N, r > -c$
$f(r,c) = f(N,-(N-1)) - (c+(N-1)), \qquad r = N, r > c$
$f(r,c) = f(N,-(N-1)) + (N-r) + 1, \qquad c = -N, r > -c$