$d_1-d_2=2m(x_k+1)-2y_k+2b-1$

$p_k=\Delta x(d_1-d_2) = \Delta x\ (2m(x_k+1)-2y_k+2b-1)$

since, $m= \Delta y/ \Delta x$

$p_k=2\ \Delta y\ (x_k+1)- 2\ \Delta x\ y_k+ \Delta x\ (2b-1)$

$=2\ \Delta y\ x_k- 2\ \Delta x\ y_k+ \Delta x\ (2b-1) +2\ \Delta y$

Let $c= \Delta x\ (2b-1) +2\ \Delta y$

$=2\ \Delta y\ x_k- 2\ \Delta x\ y_k+ c$

$y_{k+1}=y_k+1$ or y_k

$p_{k+1}=p_k+ 2\ \Delta y\ (x_{k+1}- x_k)- 2\ \Delta x(y_{k+1}- y_k)$

since $x_{k+1}=x_k+1$

$p_{k+1}=p_k+ 2\ \Delta y - 2\ \Delta x(y_{k+1}- y_k)$

$p_k < 0$, next point (x_k, y_k) or $y_{k+1}= y_k$

then, $p_{k+1}=p_k+ 2\ \Delta y - 2\ \Delta x(y_k- y_k)$

$p_{k+1}=p_k+ 2\ \Delta y$

otherwise, $y_{k+1}= y_k+1$

$p_{k+1}=p_k+ 2\ \Delta y - 2\ \Delta x(y_k+1- y_k)$

$p_{k+1}=p_k+ 2\ \Delta y - 2\ \Delta x$