$\dot{x} = f(x,y)$
$\dot{y} = g(x,y)$ (1)

$\Downarrow$ $\exists H(x,y)$ s.t. $H_y = f$, $-H_x = g$

(1) ... HAMILTONIAN SYSTEM (CHECK IF $f_x + g_y = 0$!)

$\Downarrow$ $(x(t), y(t))$ SOLUTION OF (1)

$H(x(t), y(t)) = C$

i.e. PHASE PATHS OF (1) $\hat{=}$ LEVEL SETS OF H

$\Downarrow$

(x_0, y_0) CRITICAL POINT OF H

$\updownarrow$

(x_0, y_0) EQUILIBRIUM POINT OF (1)

$H_{xx}H_{yy} - H_{xy}^2 > 0$ $\swarrow$ $\searrow$ $H_{xx}H_{yy} - H_{xy}^2 < 0$

H MAXI MIN AT (x_0, y_0)

$\updownarrow$

(1) HAS A CENTRE AT (x_0, y_0)

H SADDLE POINT AT (x_0, y_0)

$\updownarrow$

(1) HAS A SADDLE AT (x_0, y_0)