TMA05 - Q2b)c)

```
load(drawdf);
u: (4−x^2)·(y+2);
v: (x−1)·(y^2−1);
/* find the equilibrium points, list of solutions given the label sol */
sol: solve([u,v],[x,y]);
/* create a list of point_at() expressions used with wxdrawdf to add
dots to mark the positions of equilibium points. list of options is given
the label eqL */
eqL: makelist(subst(S,point_at(x,y)),S,sol);
/* creating a list of options for wxdrawdf. This time the list created is a
list of the saddle points. I have created a list of all the equilibrium
points rather than a list of just the saddle points.*/
sadL: makelist(subst(S,saddle_at(x,y)),S,sol);
/* created a list of points through which a solution path should be drawn
The list of points in this line is chosen so that all of the regions of the
phase plane have a path going through them. (The regions are defined
    to be the regions separated by nullclines.) */
snL: makelist(soln_at(pt[1],pt[2]),pt,[[1,−2],[−2,1],[2,1],[−2,−1],[2,−1]]);
/* plotting the phase portrait using wxdrawdf choosing the interval to
include all stationary points*/
wxdrawdf([u,v],[x,−4,4],[y,−4,4],eqL,sadL,snL);
```

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$$\left(4-x^2\right)(y+2)$$

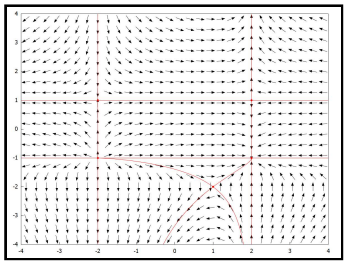
$$(x-1)\left(y^2-1\right)$$

$$[[x=1,y=-2],[x=-2,y=1],[x=2,y=1],[x=-2,y=-1],[x=2,y=-1]]$$

$$[\text{point\_at}(1,-2),\text{point\_at}(-2,1),\text{point\_at}(2,1),\text{point\_at}(-2,-1),\text{point\_at}(2,-1)]$$

$$[\text{saddle\_at}(1,-2),\text{saddle\_at}(-2,1),\text{saddle\_at}(2,1),\text{saddle\_at}(-2,-1),\text{saddle\_at}(2,-1)]$$

$$[\text{soln\_at}(1,-2),\text{soln\_at}(-2,1),\text{soln\_at}(2,1),\text{soln\_at}(-2,-1),\text{soln\_at}(2,-1)]$$



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c) The phase path that goes through the origin starts from the
equillibrium point (-2,-1) and ends at the equillibrium point (2,-1).

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