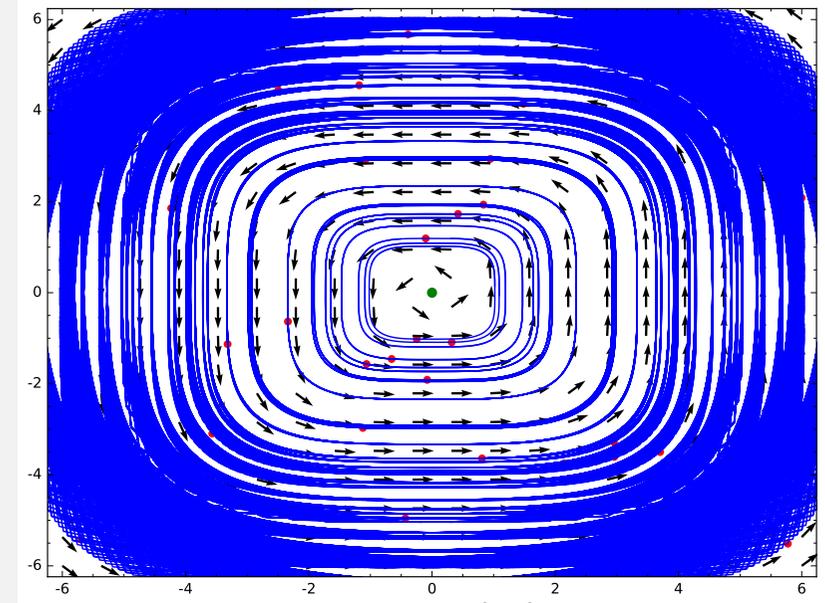


Portraits de phase pour des systèmes non linéaires autonomes

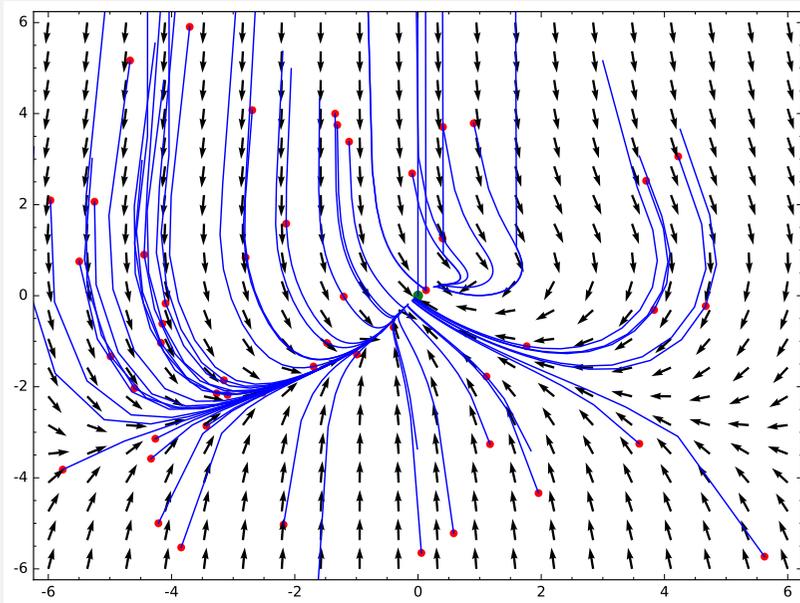
$$(x', y') = f(x, y)$$

au voisinage des points d'équilibre, avec fonctions de Liapounov



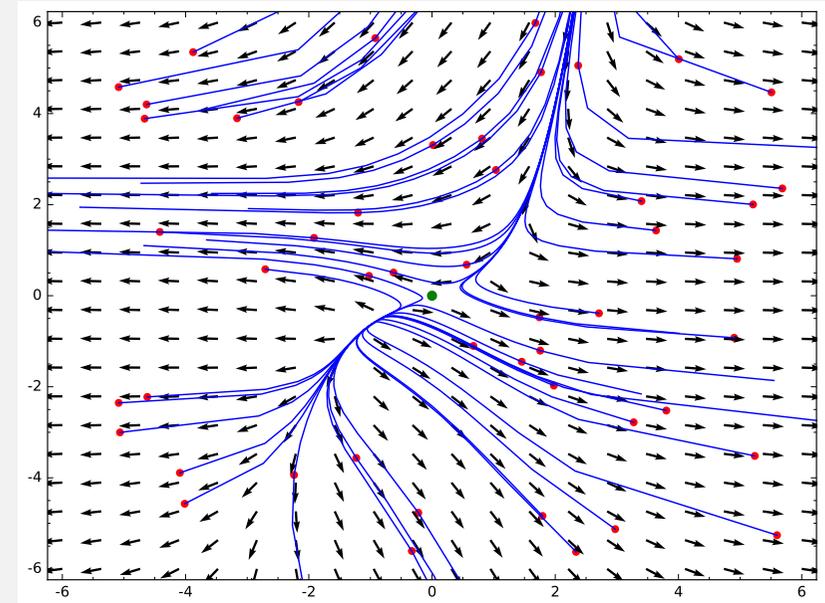
$$(x', y') = (-y^3, x^3)$$

(0, 0)



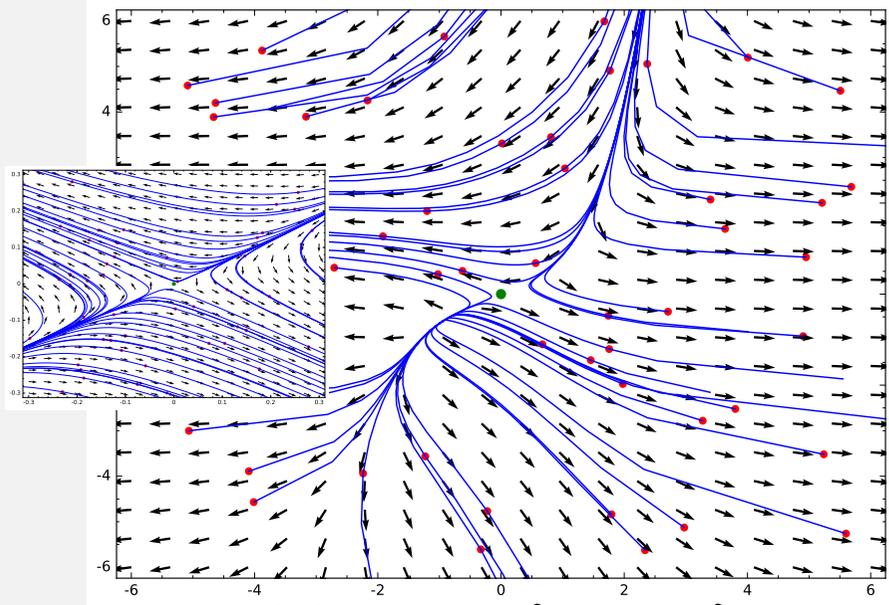
$$(x', y') = (-x + y + xy, x - y - x^2 - y^3)$$

(0, 0)



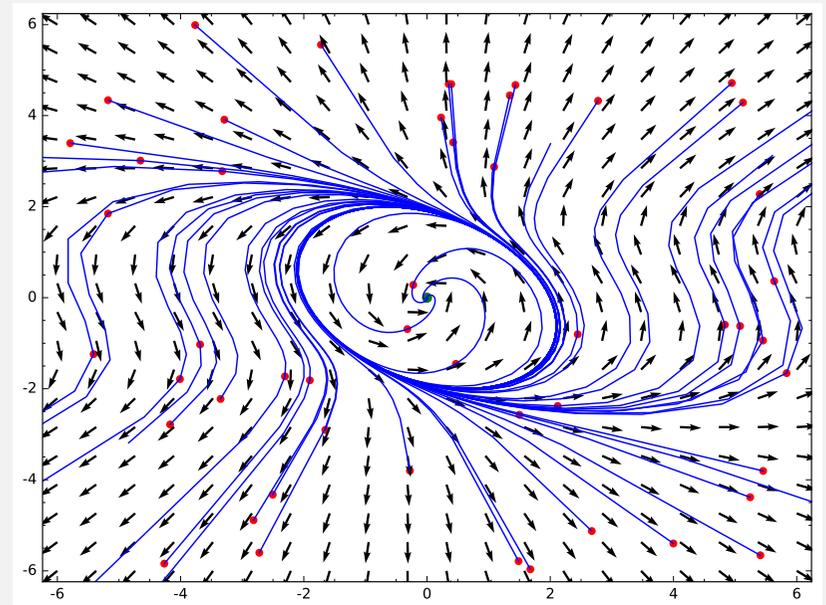
$$(x', y') = (x - 3y + x^3, -x + y - y^2)$$

(0, 0)



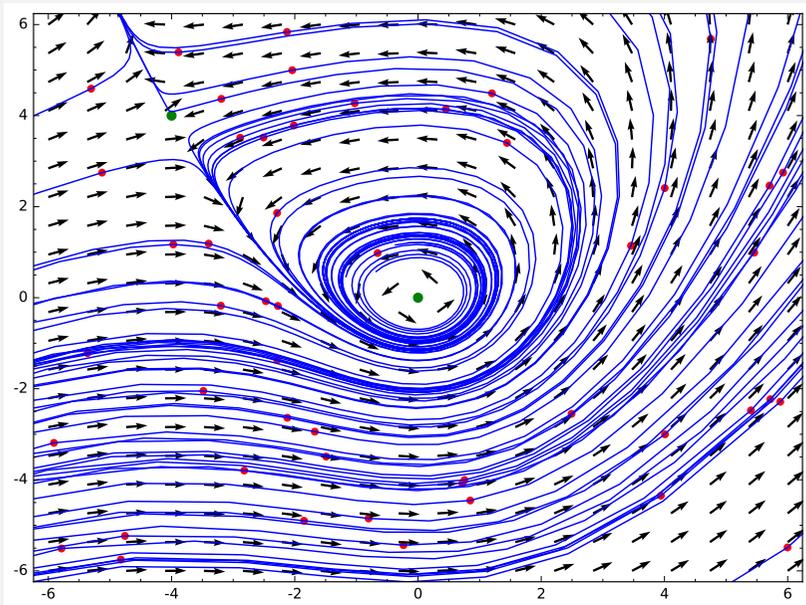
$$(x', y') = (x - 3y + x^3, -x + y - y^2)$$

(0, 0)



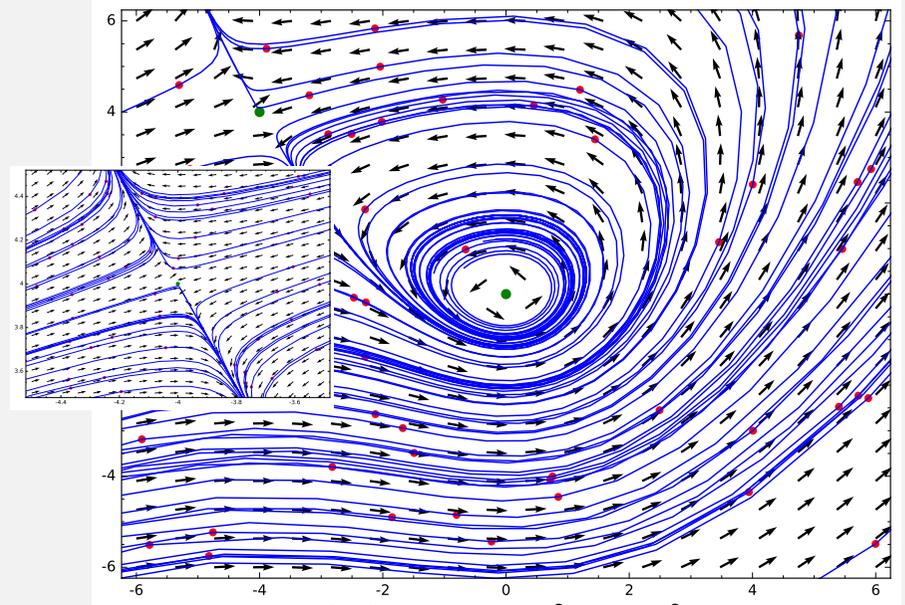
$$(x', y') = (-x - 2y + xy^2, 3x - 3y + y^3)$$

(0, 0)



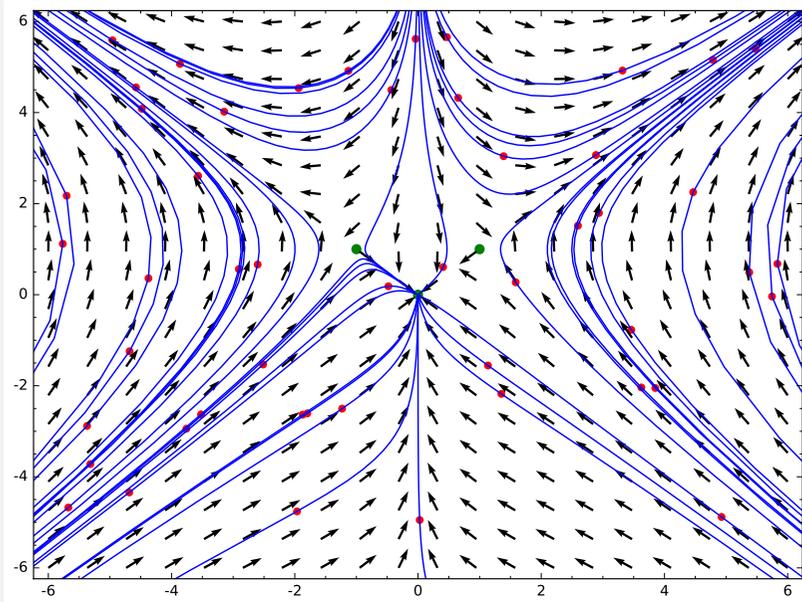
$$(x', y') = (-4y + x^2, 4x + x^2)$$

(0, 0), (-4, 4)



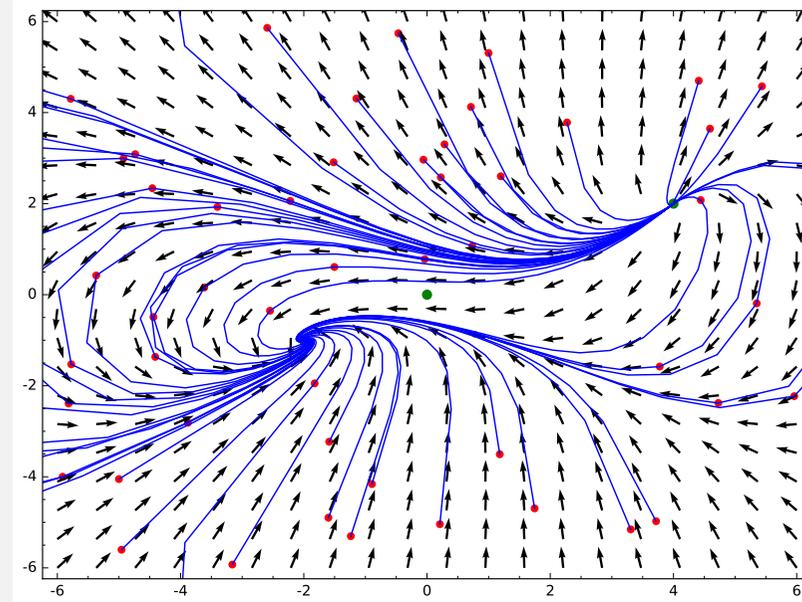
$$(x', y') = (-4y + x^2, 4x + x^2)$$

(0, 0), (-4, 4)



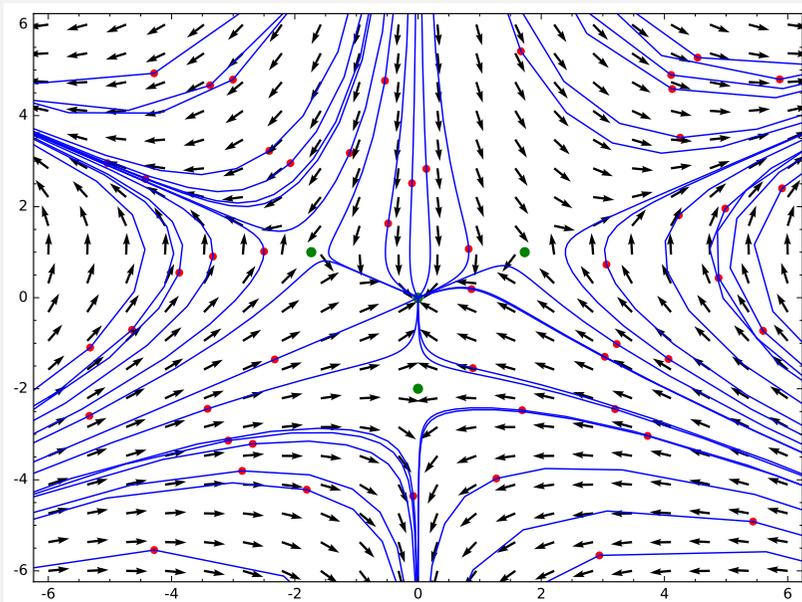
$$(x', y') = (-x + xy, -y + x^2)$$

$$(0, 0), (-1, 1), (1, 1)$$



$$(x', y') = (-4y + 2xy - 8, 4y^2 - x^2)$$

$$(4, 2), (-2, -1)$$



$$(x', y') = (-2x + 2xy, -2y + x^2 - y^2)$$

$$(0, -2), (-\sqrt{3}, 1), (\sqrt{3}, 1)$$

