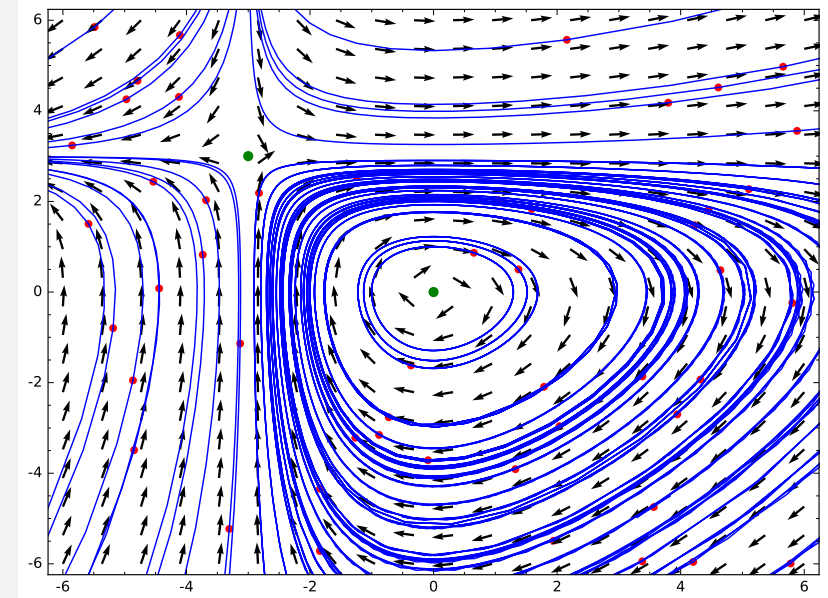


Portraits de phase pour des systèmes non linéaires autonomes

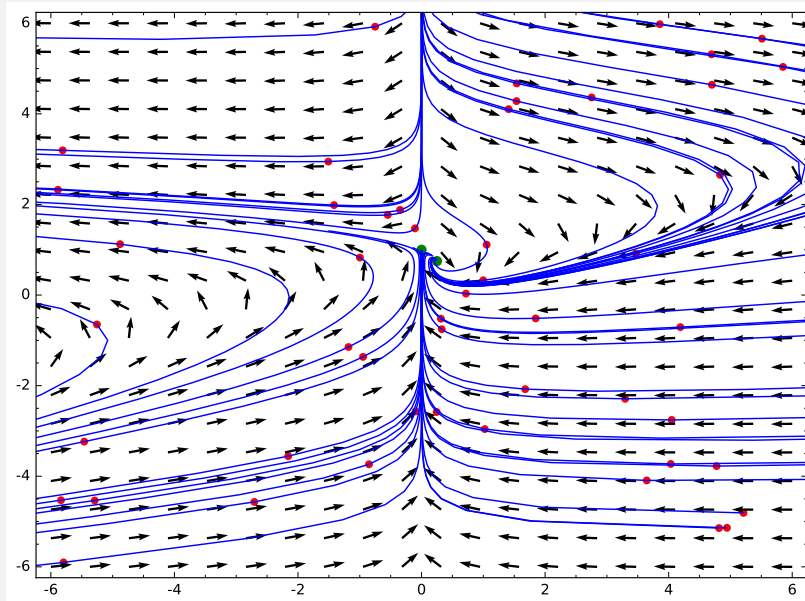
$$(x', y') = f(x, y)$$

au voisinage des points d'équilibre.



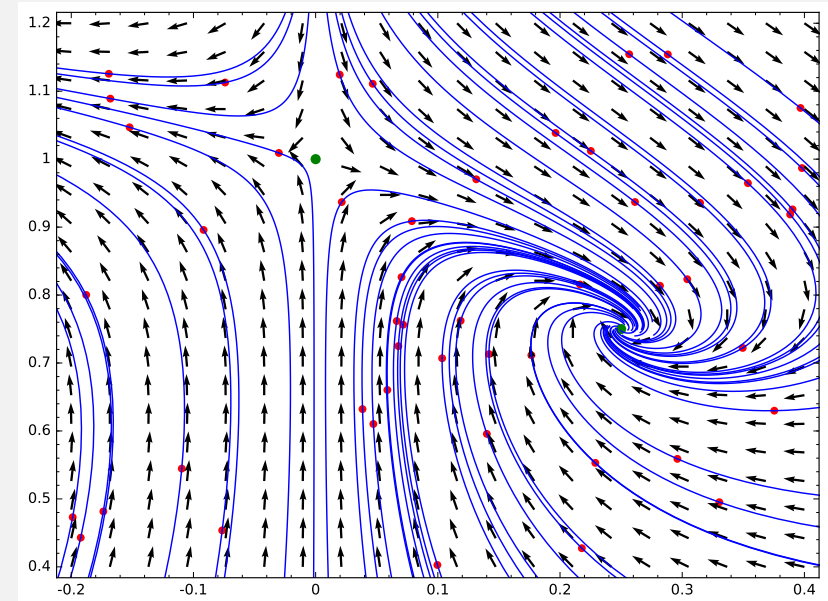
$$(x', y') = (xy + 3y, xy - 3x)$$

$$(0, 0), (-3, 3)$$



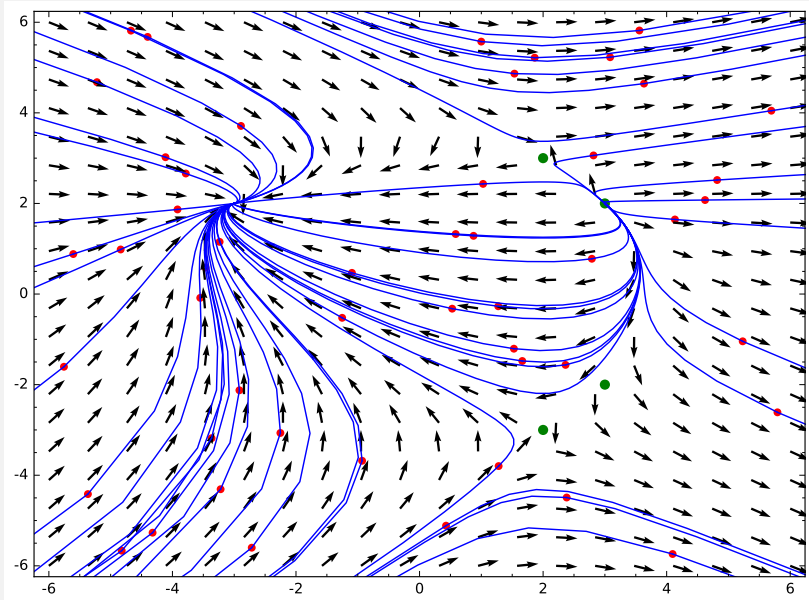
$$(x', y') = (3xy - 2x - x^2, 1 - x - y)$$

$$(1/4, 3/4), (0, 1)$$



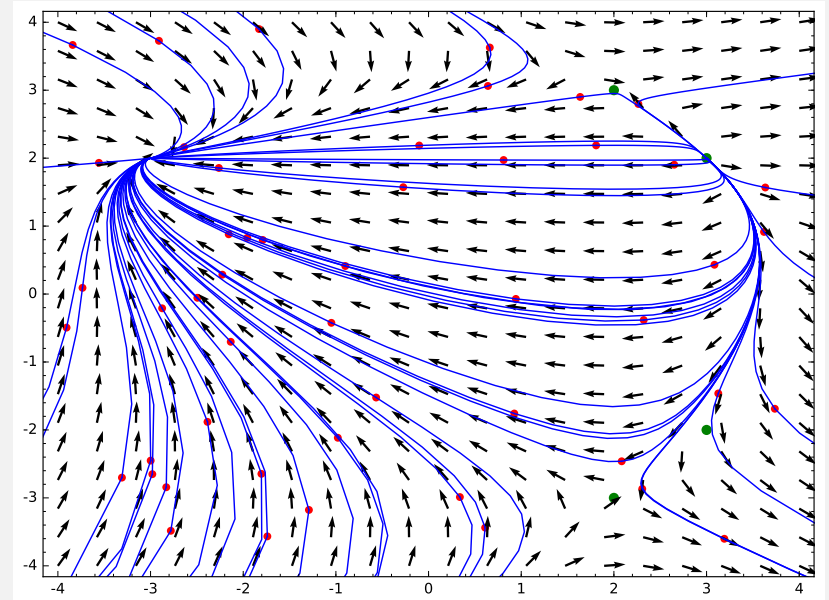
$$(x', y') = (3xy - 2x - x^2, 1 - x - y)$$

$$(1/4, 3/4), (0, 1)$$



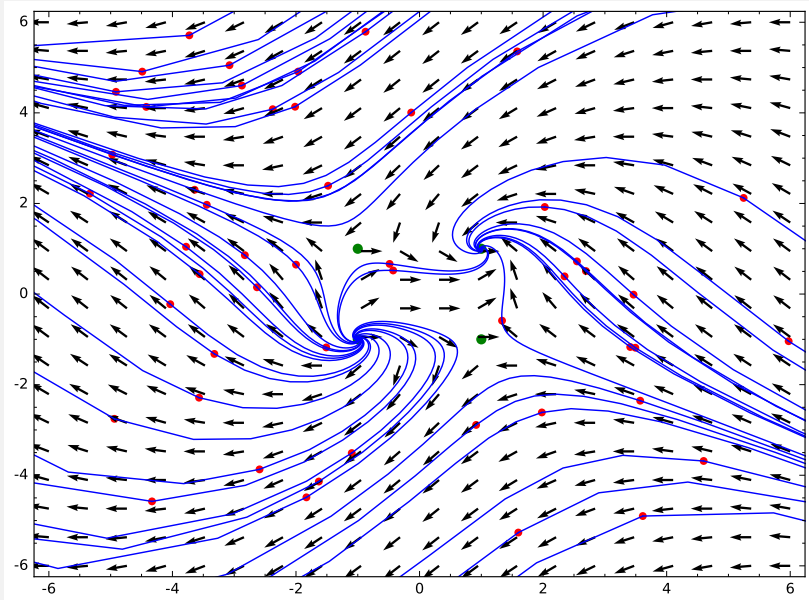
$$(x', y') = (x^2 + y^2 - 13, xy - 2x - 2y + 4)$$

$$(2, \pm 3), (\pm 3, 2)$$



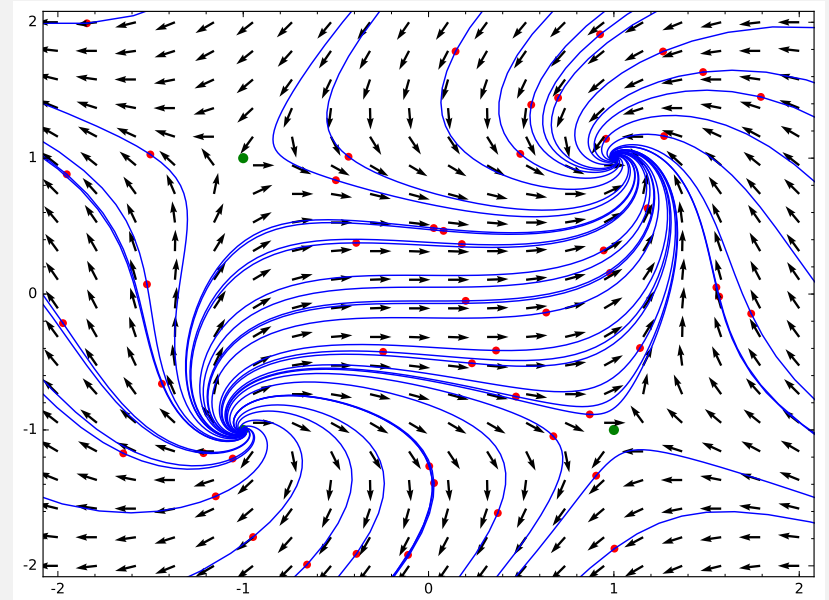
$$(x', y') = (x^2 + y^2 - 13, xy - 2x - 2y + 4)$$

$$(2, \pm 3), (\pm 3, 2)$$



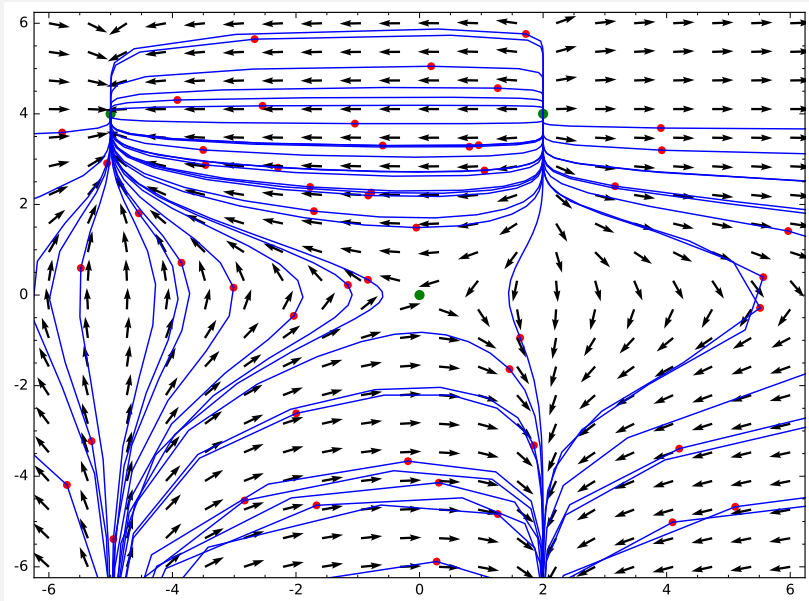
$$(x', y') = (2 - x^2 - y^2, x^2 - y^2)$$

$$(\pm 1, \pm 1)$$



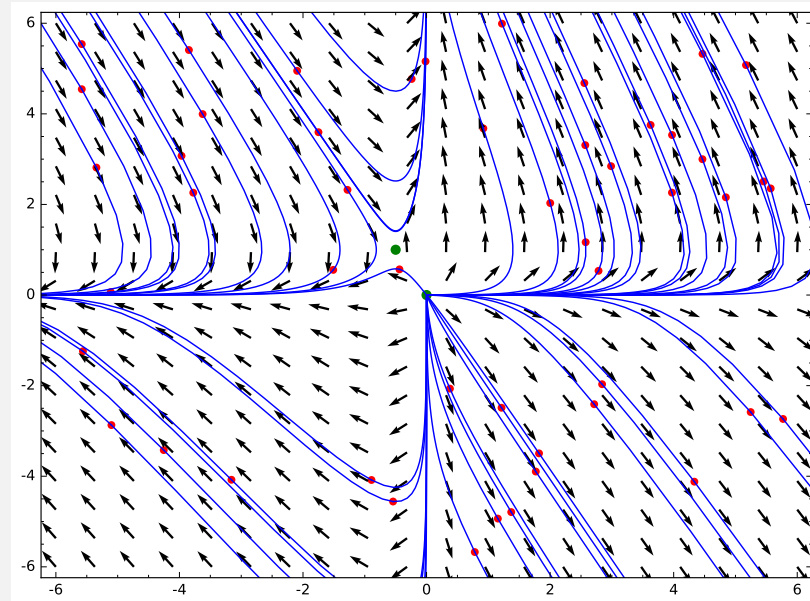
$$(x', y') = (2 - x^2 - y^2, x^2 - y^2)$$

$$(\pm 1, \pm 1)$$



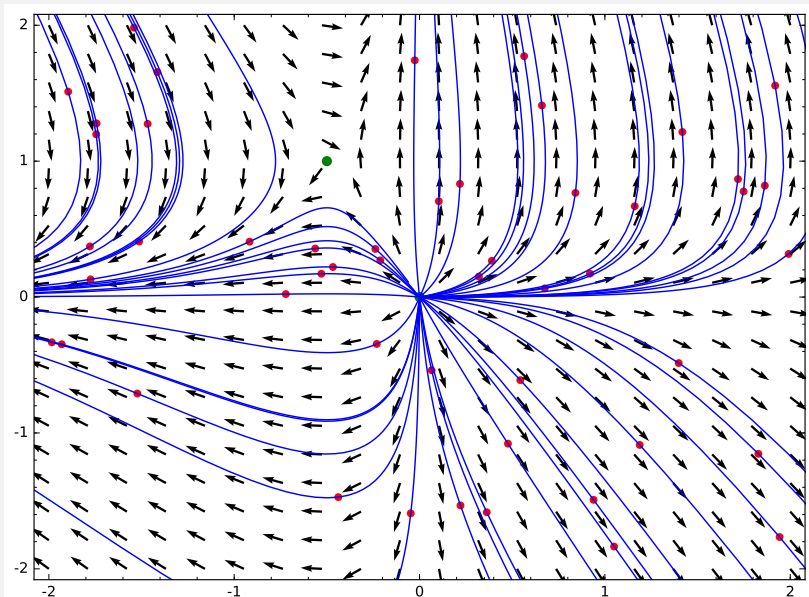
$$(x', y') = (x^2y + 3xy - 10y, xy - 4x)$$

$$(0, 0), (-5, 4), (2, 4)$$



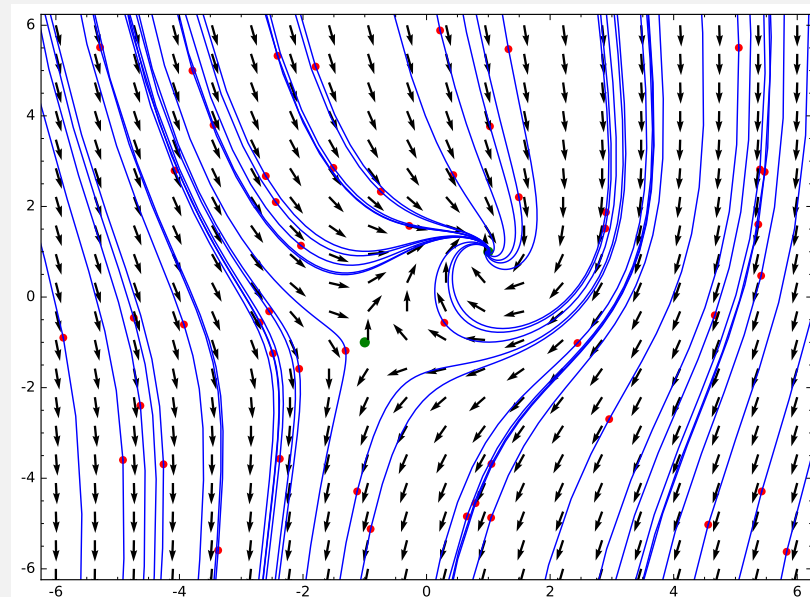
$$(x', y') = (x - xy, y + 2xy)$$

$$(0, 0), (-0.5, 1)$$



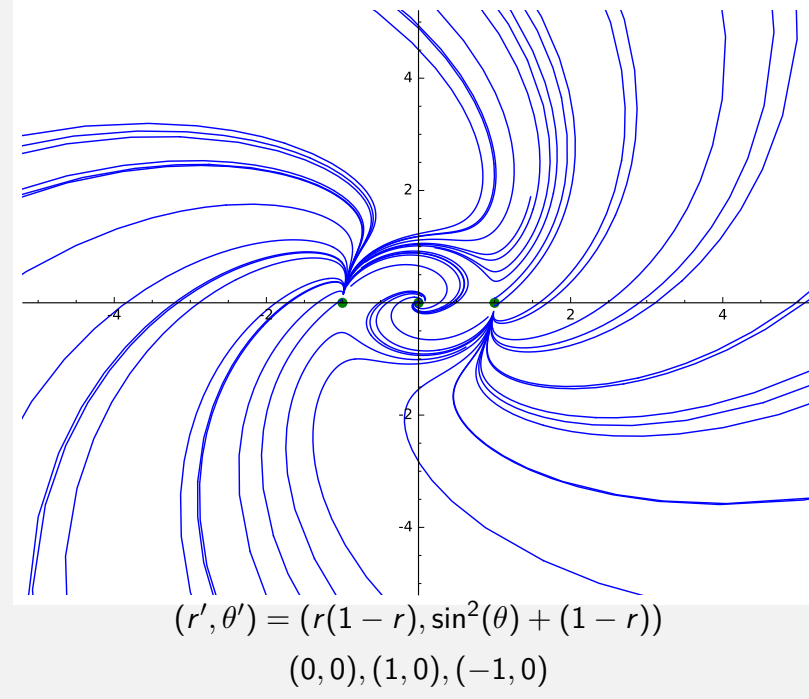
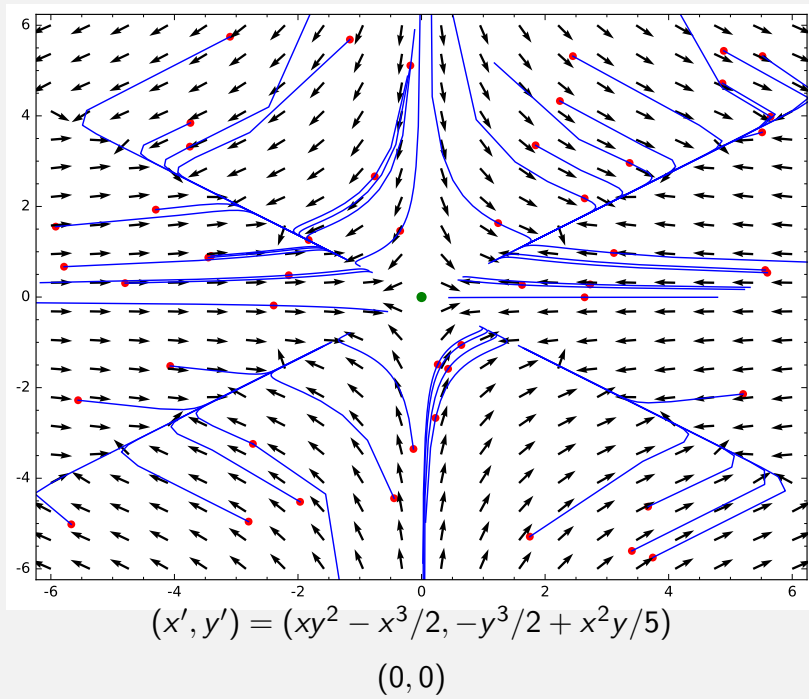
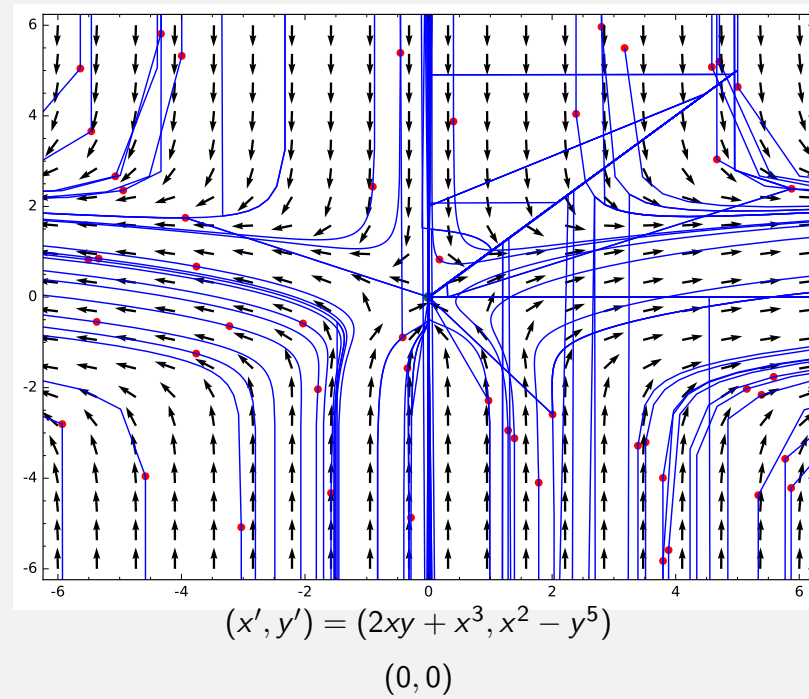
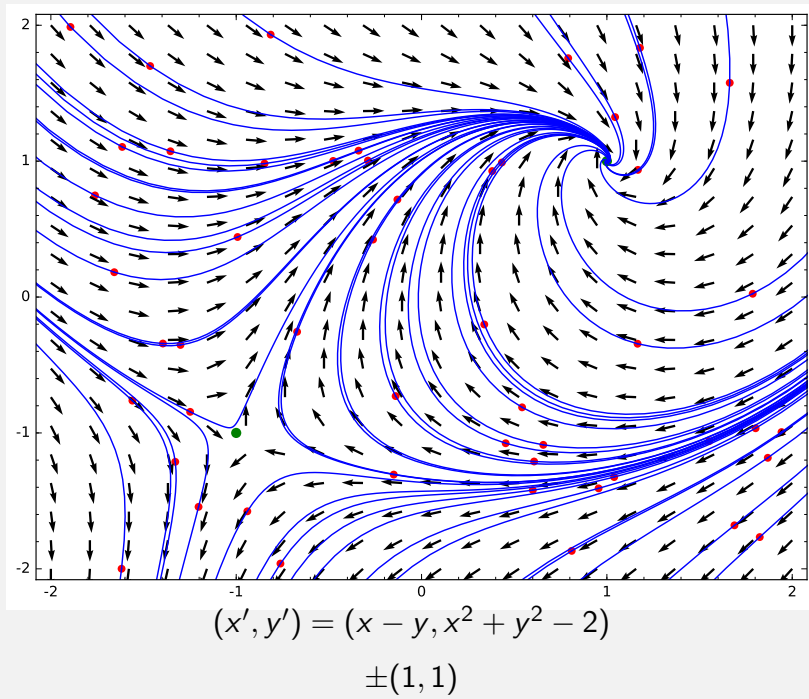
$$(x', y') = (x - xy, y + 2xy)$$

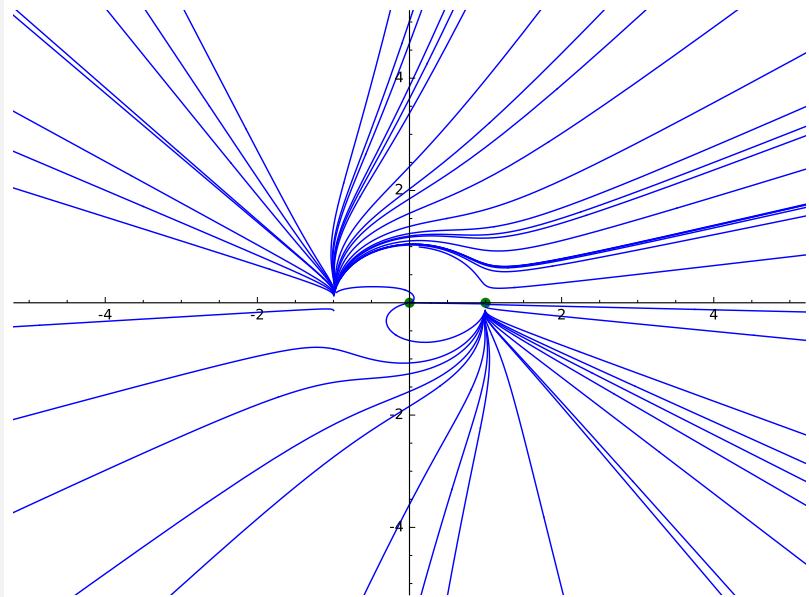
$$(0, 0), (-0.5, 1)$$



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

$$\pm(1, 1)$$

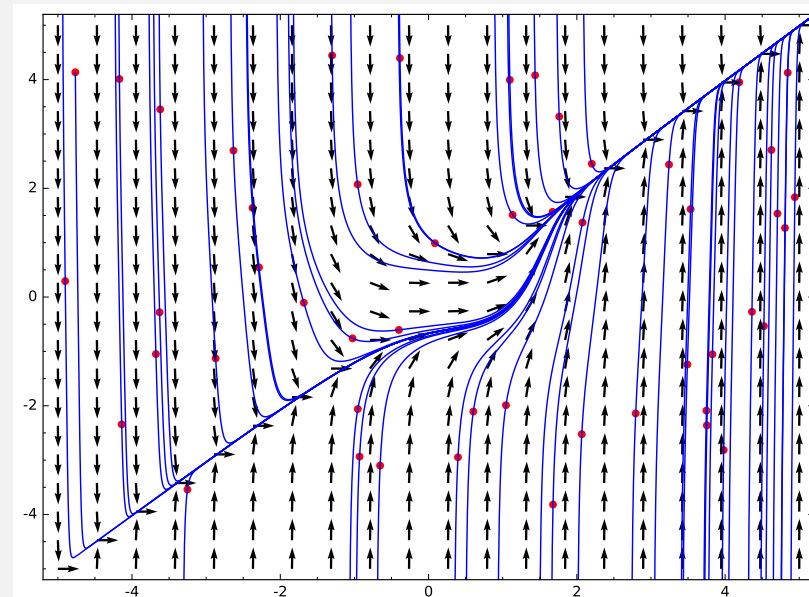




$$(r', \theta') = (r(1-r), \sin^2(\theta))$$

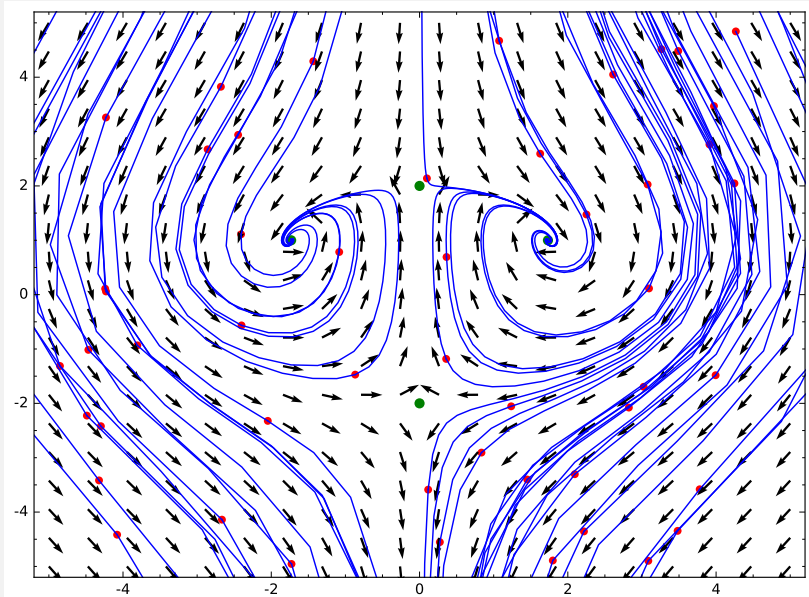
$$(0, 0), (1, 0), (-1, 0)$$

ÉD en polaire



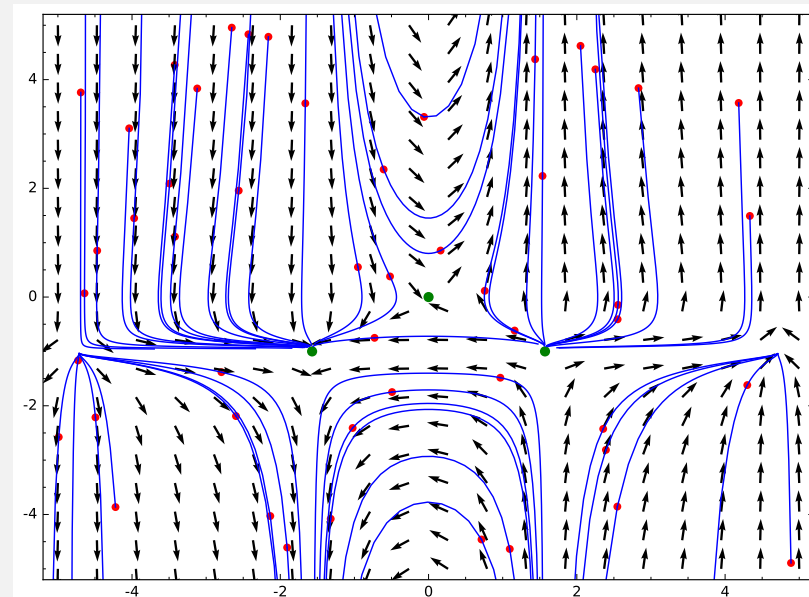
$$(x', y') = (1, x^3 - y^3)$$

$$\{x = \}$$



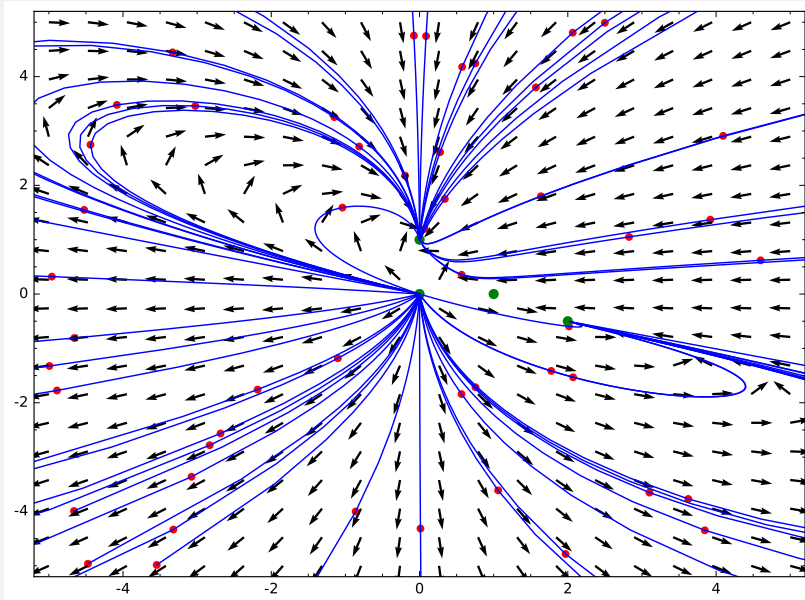
$$(x', y') = (x(y-1), 4-x^2-y^2)$$

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



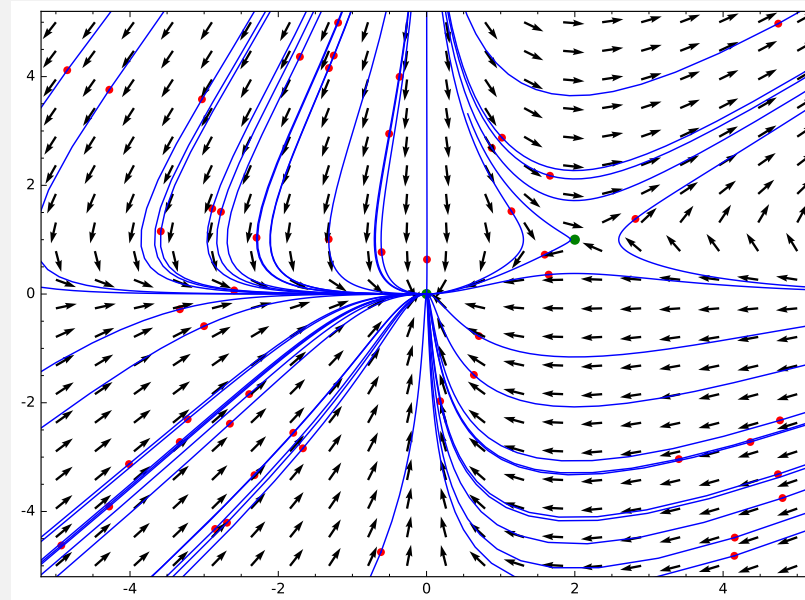
$$(x', y') = (y \cos(x), x(1+y)^2)$$

$$(0, 0), (\pi/2 + \mathbb{Z}\pi, -1)$$



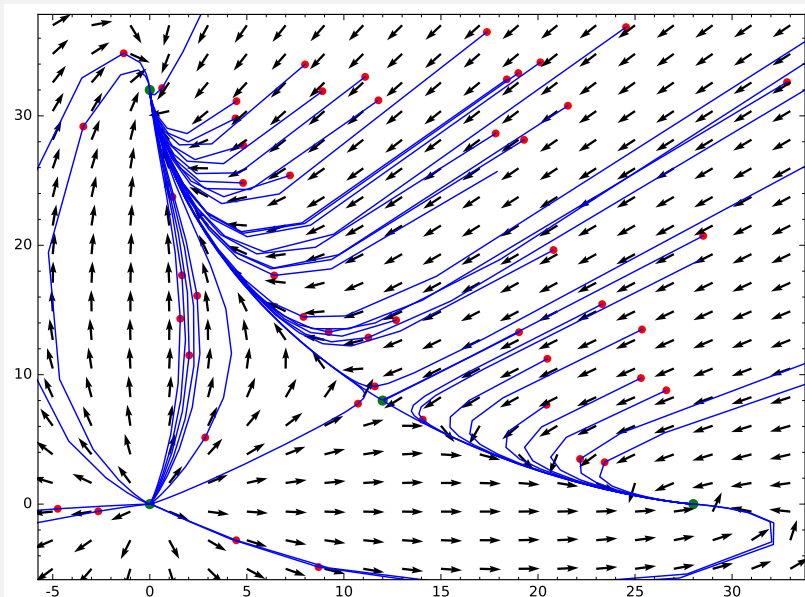
$$(x', y') = (x - x^2 - 2xy, y - y^2 - 3xy/4)$$

$(0, 0), (1, 0), (0, 1), (2, -1/2)$



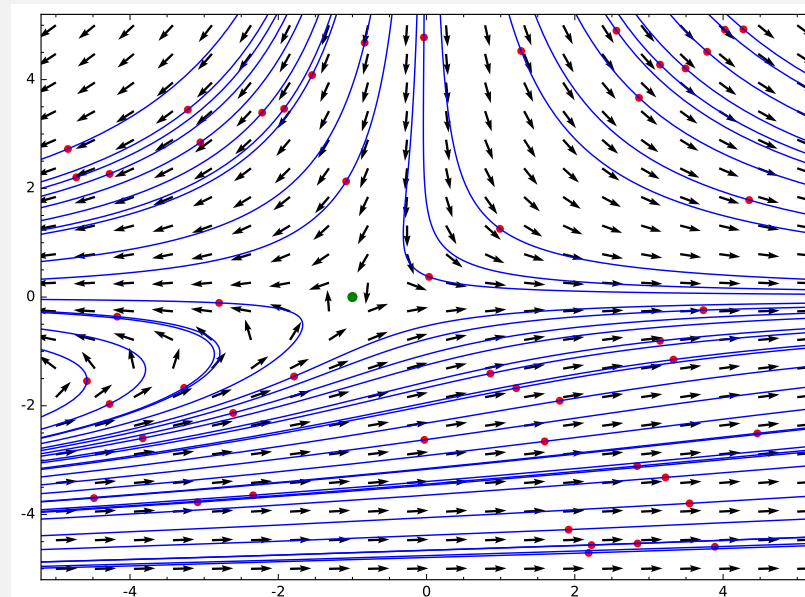
$$(x', y') = (-x + xy, -2y + xy)$$

$(0, 0), (2, 1)$



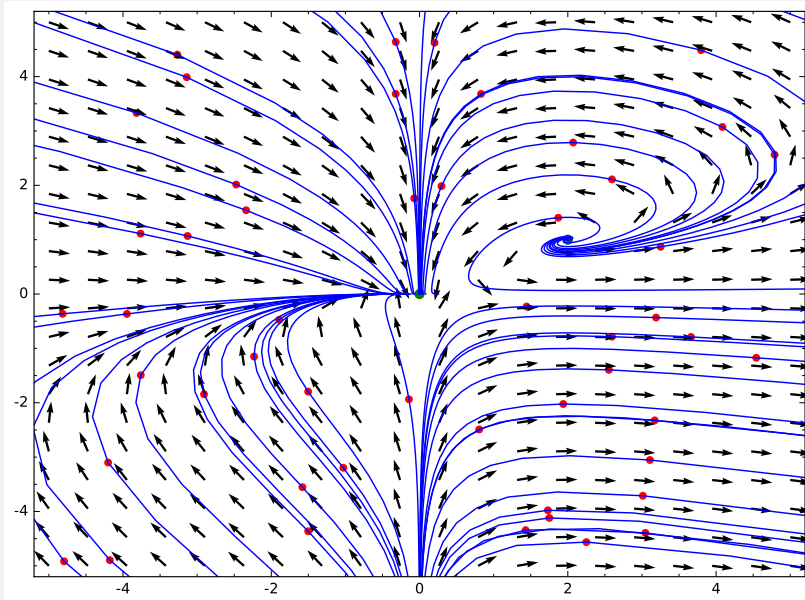
$$(x', y') = (14x - x^2/2 - xy, 16y - y^2/2 - xy)$$

$(0, 0), (28, 0), (0, 32), (12, 8)$



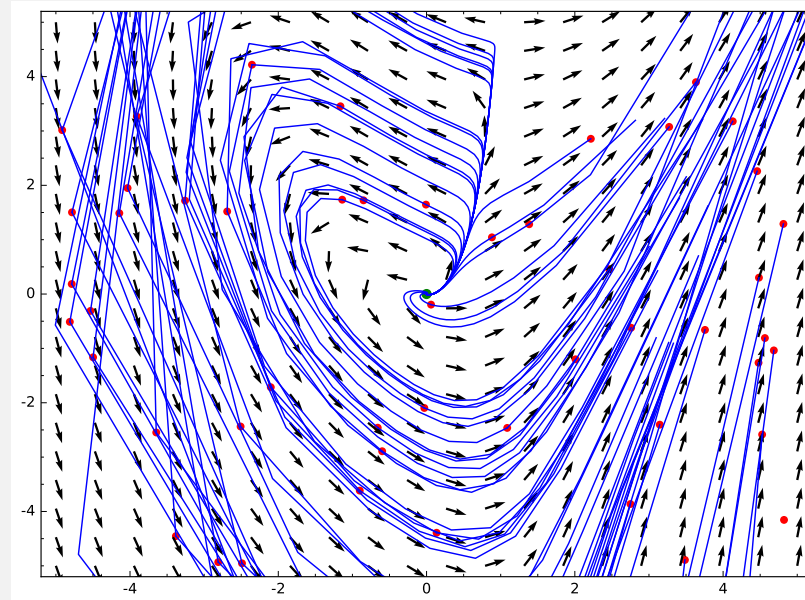
$$(x', y') = (x + e^{-y}, -y)$$

$(-1, 0)$



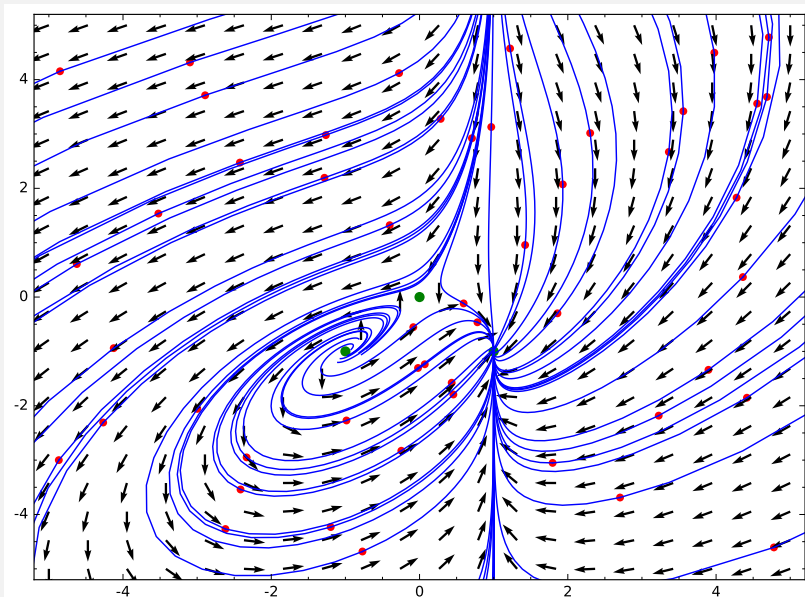
$$(x', y') = ((x - 2y)x, (x - 2y)y)$$

$$(0, 0), (2, 1)$$



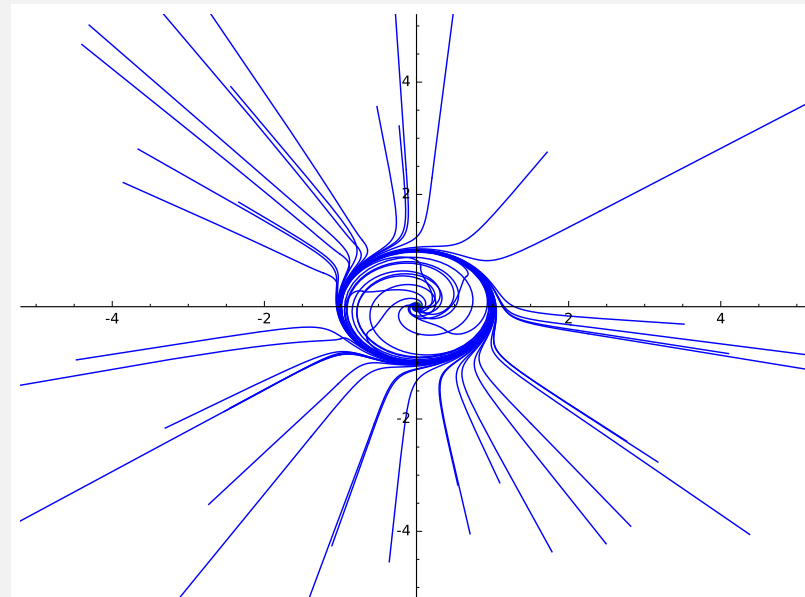
$$(x', y') = (2x - 3y + 4x^2 + 2xy, x + 2y - 3xy + 4x^3)$$

$$(0, 0)$$



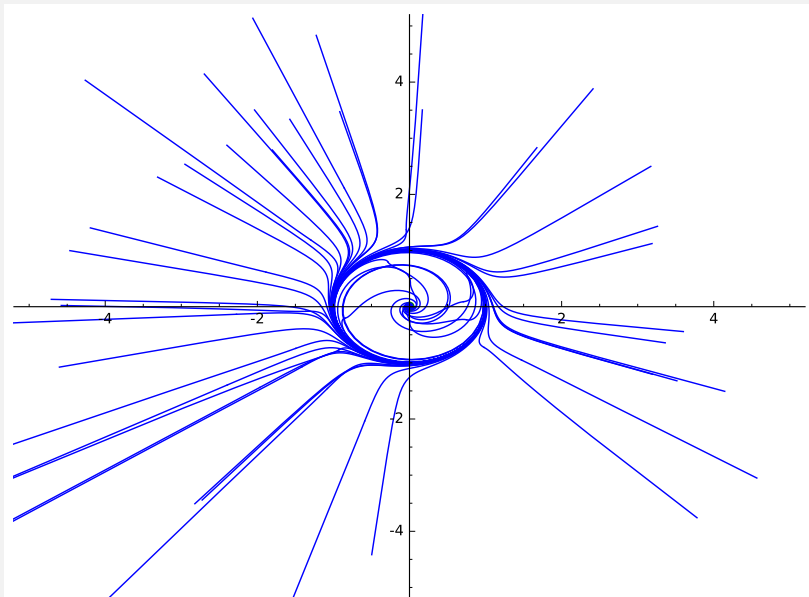
$$(x', y') = (x - y - x^2 + xy, -x^2 - y)$$

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



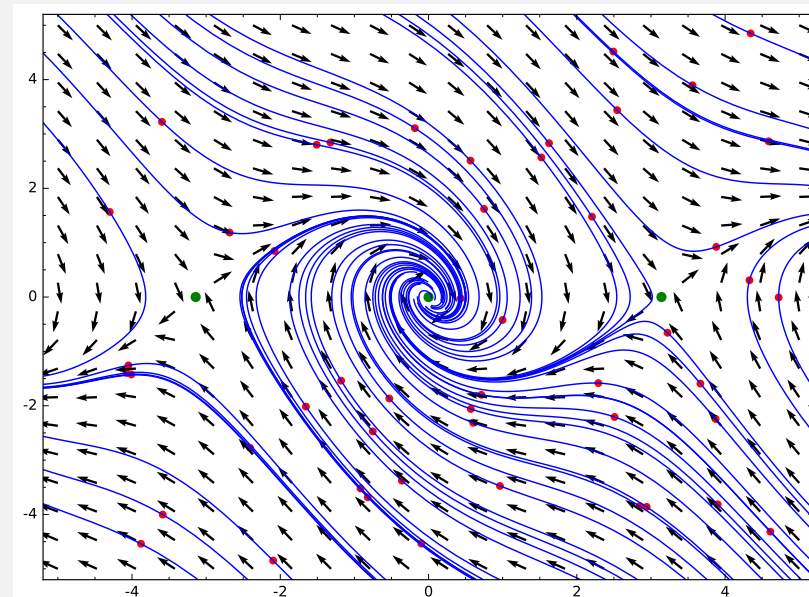
$$(x', y') = (-ky + x(1 - x^2 - y^2), kx + y(1 - x^2 - y^2)a)$$

$$(0, 0)$$



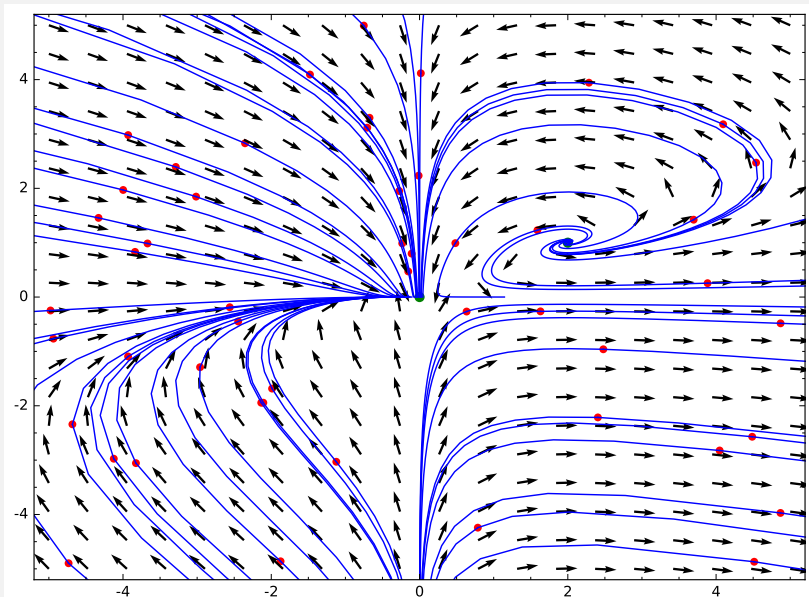
$$(x', y') = (-ky + x(1 - x^2 - y^2), kx + y(1 - x^2 - y^2))$$

(0, 0)



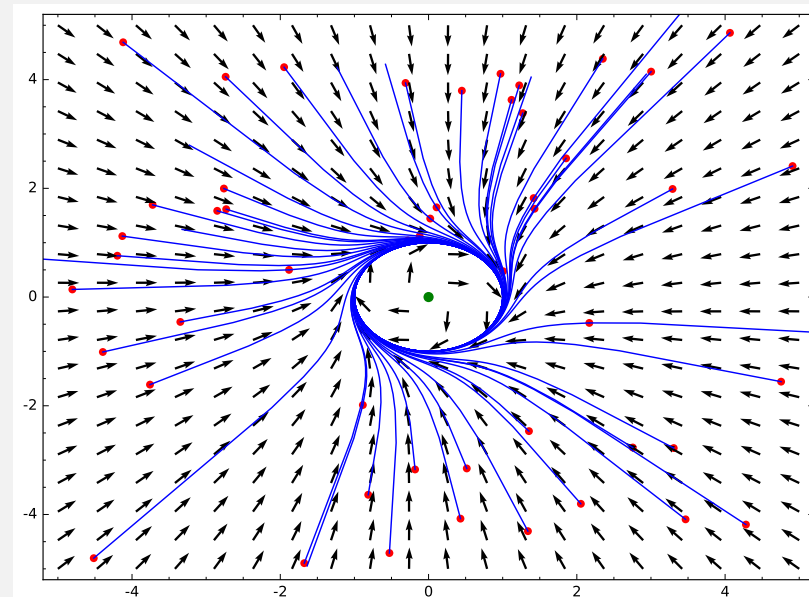
$$(x', y') = (y, -y - 2 \sin x)$$

$\mathbb{Z}(\pi, 0)$



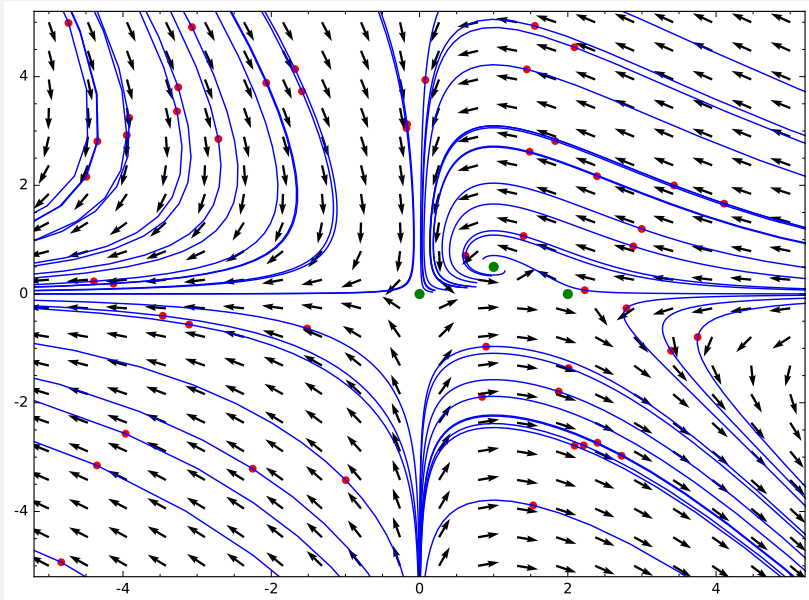
$$(x', y') = ((x - 2y)x, (x - 2y)y)$$

(0, 0), (2, 1)



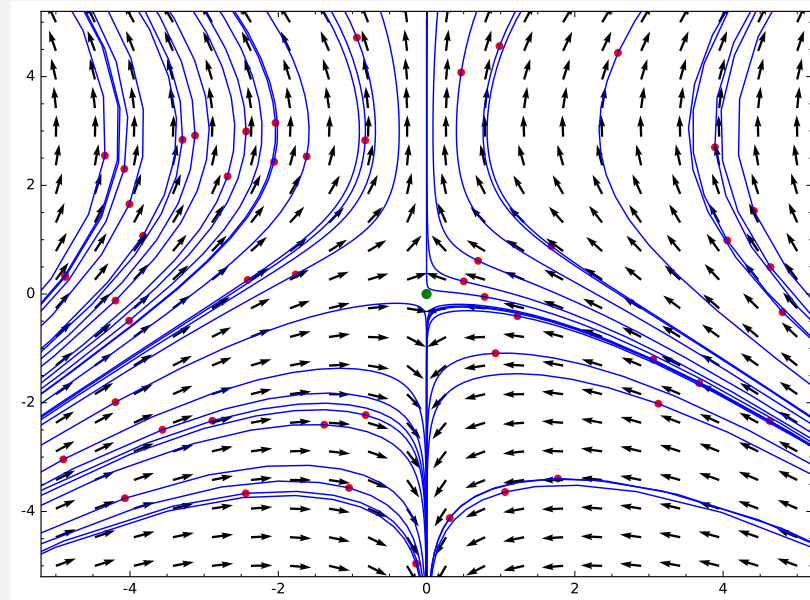
$$(x', y') = (x + y - x(x^2 + y^2), -x + y - y(x^2 + y^2))$$

(0, 0)



$$(x', y') = (x(1 - x/2) - xy, xy - y)$$

$(0, 0), (2, 0), (1, 1/2)$



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

$(0, 0)$