McGehee's counterexample map of the plane is
$$f(x, y) = (x - x^2 + y^2, 2xy)$$
a) Rewrite f in complex variable terms, so in terms of a single complex variable z. (You are allowed conjugation !)

b) Establish the equivariance of this map with respect to the cyclic group of three elements which is generated by the third root of unity ω.

c) Establish that the "stable manifold" of the origin $z = 0$ consists of three rays separated by 120 degrees.

d) Establish that the "unstable manifold" consists of three rays oriented at 120 degrees.