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Exercises Singularity Theory

1. *(4 points)* Do the following germs have isolated singularities ? If yes, determine their Milnor number and the smallest number k such that f is k-determined (i.e., their determinacy).

   (a) $f = x^4 + y^3 \in \mathcal{R}_2$

   (b) $f = x^3 + y^5 + x \in \mathcal{R}_2$.

   (c) $f = x^2 - y^2 \in \mathcal{R}_3$

2. *(2 points)* Compute the Milnor number of the following germs.

   (a) $f = x^3 + xy^p \in \mathcal{R}_2$, $p > 2$,

   (b) $f = x^p + y^p + x^2y^2 \in \mathcal{R}_2$, $p > 3$,

   (c) $f = x^2 + y^2 + 2xy \in \mathcal{R}_2$.

3. *(2 points)* Let $g(x, y, z) = z^p + f(x, y) \in \mathcal{R}_3$ with $f \in \mathcal{R}_2$, $p \in \mathbb{N}$. Determine a formula for the Milnor number of g in terms of the Milnor number of f.

4. *(2 points)* Show that the following two germs f and g are not right equivalent as elements of $\mathcal{E}_2$

$$f = y^4 + x^2y \text{ and } g = -f = -y^4 - x^2y.$$

To be handed in until Wednesday, 15th November 2017