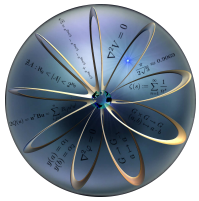

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Brouwer degree

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Suppose that M and N are two oriented differentiable manifolds of dimension n (without boundary) with M compact and N connected and suppose that $f\colon M \to N$ is a differentiable mapping. Let $Df(x)$ denote the differential mapping at the point $x \in M$, that is the linear mapping $Df(x)\colon T_x(M) \to T_{f(x)}(N)$. Let $\operatorname{sign} Df(x)$ denote the sign of the determinant of $Df(x)$. That is the sign is positive if f preserves orientation and negative if f reverses orientation.

Definition. Let $y \in N$ be a regular value, then we define the *Brower degree* (or just degree) of f by

$$\deg f := \sum_{x \in f^{-1}(y)} \operatorname{sign} Df(x).$$

It can be shown that the degree does not depend on the regular value y that we pick so that $\deg f$ is well defined.

Note that this degree coincides with the `http://planetmath.org/Degree5`degree as defined for maps of spheres.

References

[1] John W. Milnor. . The University Press of Virginia, Charlottesville, Virginia, 1969.