Path-independent

Idea: If the boundary in Fundamental Theorem of Calculus is the same, then the integral of derivative over a region should be the same. Path-independent is this equivalance in the context of Vector line integral

A Vector field $\vec{F}$ is path-independent if the Vector line integral $\int_C \vec{F} \cdot \mathrm{d}\vec{r}$ is the same no matter what path you take.

$\oint_C \vec{F} \cdot \mathrm{d}\vec{r} = 0 \leftrightarrow \vec{F}$ is path-independent

For any closed curve C