Vector Calculus - Important Topics

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Gradient

The gradient of a scalar function f(x, y, z) is a vector that points in the direction of the greatest rate of increase of the function.

Divergence and Curl

Divergence measures the magnitude of a source or sink at a given point in a vector field, while curl represents the rotation of the field around a point.

Directional Derivatives

The rate of change of a function in the direction of a given vector.

Irrotational and Solenoidal Vector Fields

A vector field is irrotational if curl(F) = 0 and solenoidal if div(F) = 0.

Gauss Divergence Theorem

Relates the flux of a vector field through a closed surface to the divergence of the field inside the surface.

Stokes' Theorem

Relates a surface integral over a surface S to a line integral over its boundary curve.