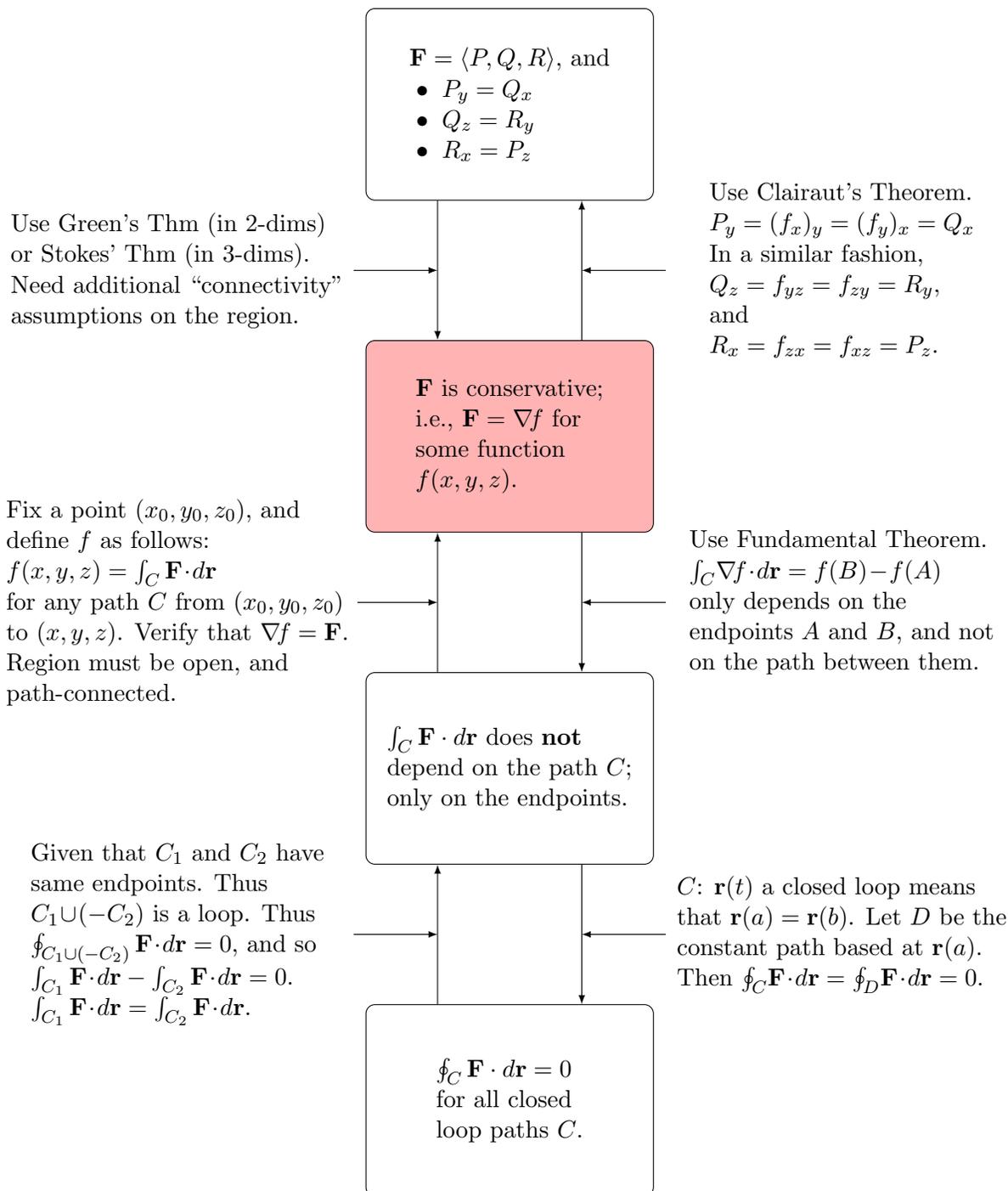


Vector Calculus — Conservative Vector Fields.

A vector field \mathbf{F} is said to be *conservative* if it is the gradient of some scalar field (function) f . This sheet shows how to reformulate the fact that \mathbf{F} is conservative in terms of properties of path integrals (lower two boxes), and how to test that a vector field is conservative by taking partial derivatives of its component functions (top box).



In physics, a force field is *conservative* if it is the negative gradient of a *potential (energy) function*. Motion under a conservative force field satisfies a conservation law: *the sum of the potential energy and kinetic energy of a particle moving under the force field is constant*. We proved this in class.