Chapter 16.7

Glossary:

The **Cartesian coordinate system** is a coordinate system in ℝ3 that represents the position of a point relative to the **origin** (the point at which all the coordinate axes intersect, denoted as ), as the distance of from the origin along each coordinate axis. That is to say, if is units away from the origin on the axis, units away from the origin on the axis, and units away from the origin on the axis, then

The **cylindrical coordinate system** is a coordinate system in ℝ3 that represents the position of a point relative to the origin as the combination of the radius of a circle equal in magnitude to the distance from the origin to point (denoted as ), the angle the line from the origin to makes with the axis (denoted as ), and the distance from the origin to along the axis (denoted as ), formally expressed as

If we want to switch from Cartesian coordinates to cylindrical, we can use the fact that , , and . If we want to switch from cylindrical to Cartesian, we can use the fact that , , and .

If a function over a type 1 region, where is polar region , then we can express the triple integral of over as

Using our definition for a double integral in polar coordinates, that is

We can form an iterated triple integral: