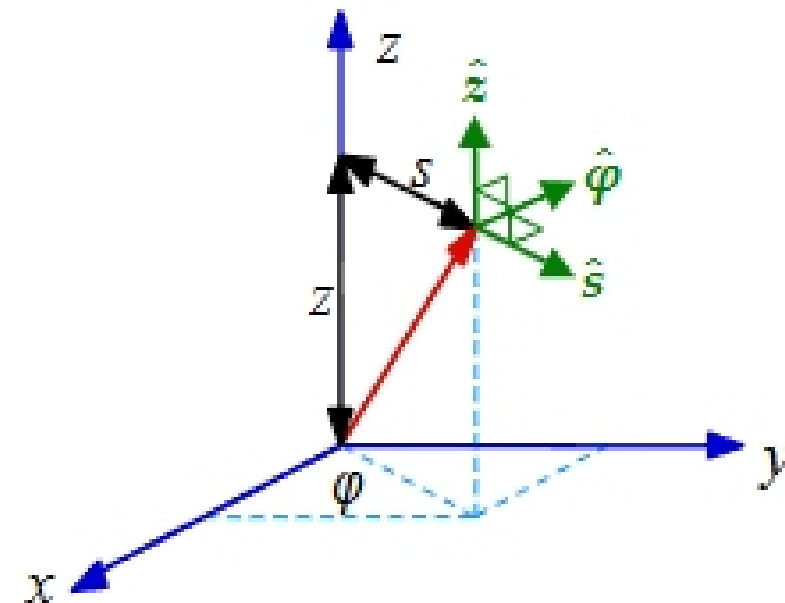
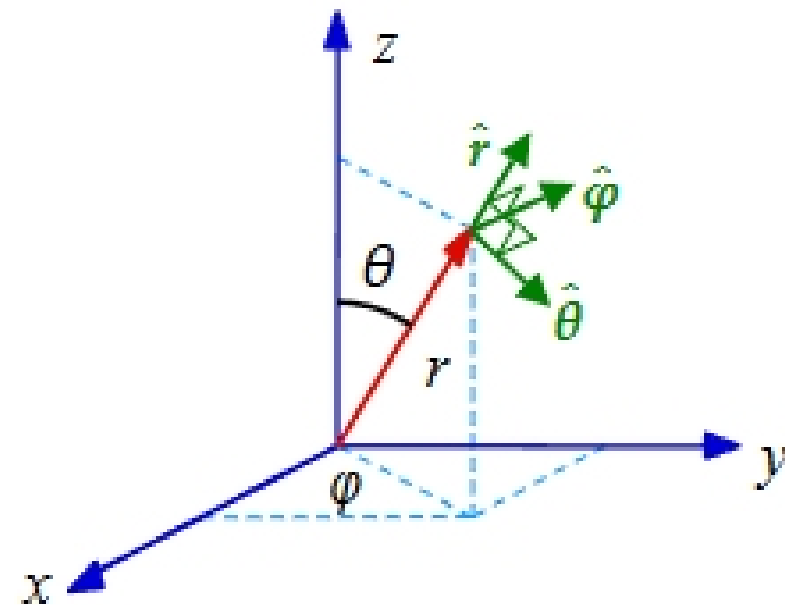

Today in Physics 217: more vector calculus

- Vector derivatives in curvilinear coordinate systems: spherical and cylindrical coordinates.
- The Dirac delta function.



Curvilinear coordinates

Coordinate systems:

- Cartesian coordinates: used to describe systems without any apparent symmetry.
- Curvilinear coordinates: used to describe systems with symmetry. We will often find spherical symmetry or axial symmetry in the problems we will do this semester, and will thus use
 - Spherical coordinates
 - Cylindrical coordinates

There are other curvilinear coordinate systems (e.g. ellipsoidal) that have special virtues, but we won't get to use them this semester.

Spherical coordinates

The location of a point P can be defined by specifying the following three parameters:

- Radius r : distance of P from the origin.
- Polar angle θ : angle between the position vector of P and the z axis. (Like 90° – latitude.)
- Azimuthal angle φ : angle between the projection of the position vector P and the x axis. (Like longitude.)

