

1 Polar vs. Spherical Coordinates

Show that the plane polar coordinates are equivalent to spherical coordinates if we make the choices:

- (a) The direction of $\theta = 0$ in spherical coordinates is the same as the direction of out of the plane in plane polar coordinates.
- (b) Given the correspondence above, then if we choose the θ of spherical coordinates is to be $\pi/2$, we restrict to the equatorial plane of spherical coordinates.

2 Central Forces are Conservative

(Quick) Purpose: Recall the relationship between conservative forces and potentials.

Show that a central force is **always** conservative. Find the scalar potential U corresponding to the central force $\vec{F} = f(r)\hat{r}$ and show that it depends only on the distance from the center of mass, i.e. $U = U(r)$.