

## 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 correspondance above, then if we choose the  $\theta$  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.  $U = U(r)$ .