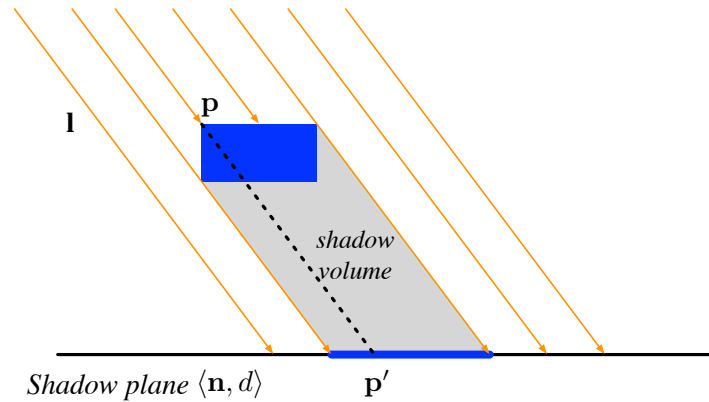


1. Assume that we are approximating the circle defined by $x^2 + y^2 - r^2 = 0$ and $z = d$ (in eye space) by an n -sided ($n \geq 3$) regular polygon at the same location. Assume that the distance from the center of the polygon (*i.e.*, the Z-axis) to a vertex in the polygon is r . If the focal length is e , what is the maximum error in the radius of the approximation in projection-space coordinates?
2. Planar projective shadowing is a simple technique for rendering shadows cast onto a planar surface. Consider the following situation



where \mathbf{l} is the direction of light, $P = \langle \mathbf{n}, d \rangle$ is the planar surface, and \mathbf{p} is a vertex of the shadow caster.

- (a) Derive the point \mathbf{p}' that is the projection of \mathbf{p} onto the plane P .
- (b) The result from part (a) can be represented as a 4×4 transformation matrix \mathbf{M} that maps points on the shadow caster to *homogeneous* coordinates on the plane. What is \mathbf{M} ?