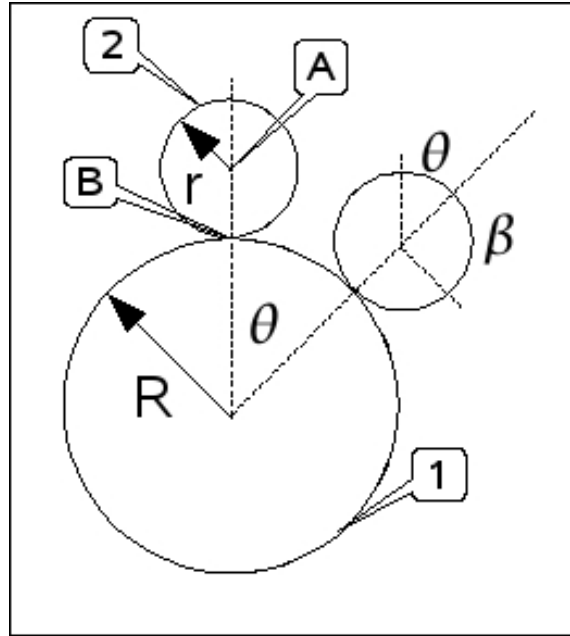


ENGR 3063 Dynamics
Rolling on Curved Surfaces

Consider the motion of disc 2 over disc 1 below.



The distance rolled by the disc relative to point A (the center of the disc) is:

$$s_B = \theta R$$

This distance may also be expressed in terms of the angle β which is measured relative to point A on the disc.

$$s_B = r \beta$$

The distance that point A moves is

$$s_A = (R+r)\theta$$

The total angle that the disc turns through in this motion must be $\beta + \theta$. By equating the two equations above for s_B we obtain

$$\theta + \beta = \beta \frac{R+r}{R} = \theta \frac{R+r}{r}$$

Assignment – try this same exercise on a concave surface (rather than the convex one here).