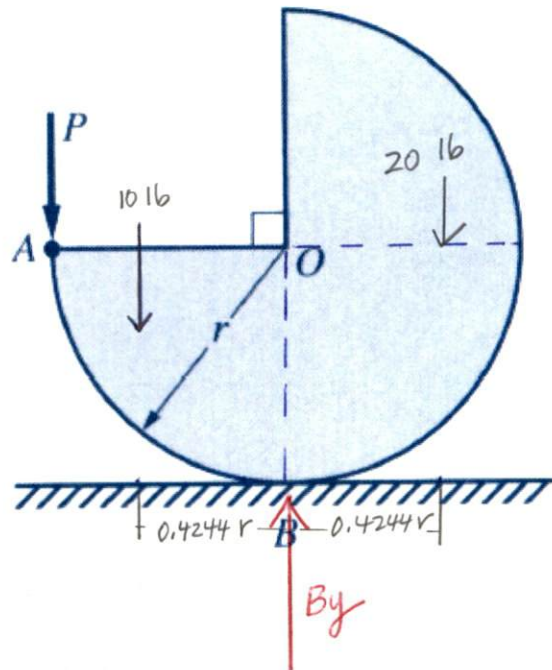7-22 The homogeneous disk in Fig. P7-22 has a uniform thickness and weighs 30 lb. Determine the force P required to maintain the equilibrium of the disk in the position shown.

Solution.

FBD

$$\text{ccw } +M \text{ } \circlearrowleft$$
$$\text{cw } -M \text{ } \circlearrowright$$

Equilibrium Equations

$[\Sigma M_B = 0]$ $- 20 \text{ lb}(0.4244 \text{ r}) + 10 \text{ lb}(0.4244 \text{r}) + P(r) = 0$

$$P = \frac{20 \text{ lb}(0.4244 \text{ r}) - 10 \text{ lb}(0.4244 \text{ r})}{r}$$

$$= 42.4 \text{ lb} \quad \downarrow$$