

1-76\*

$$W = 135(9.81) = 1324.50 \text{ N}$$

$$\phi = \cos^{-1} \frac{220 - 75}{220} = 48.769^\circ$$

First draw a free-body diagram of the cylinder. When the cylinder just starts to rotate about the step, the normal force  $N$  becomes zero. Then moment equilibrium gives

$$\zeta \Sigma M_C = 0: \quad 220[W \sin(20^\circ + \phi)] - 220[P \cos(20^\circ + \phi)] = 0$$

$$P = 3410 \text{ N} \dots\dots\dots \text{Ans.}$$

