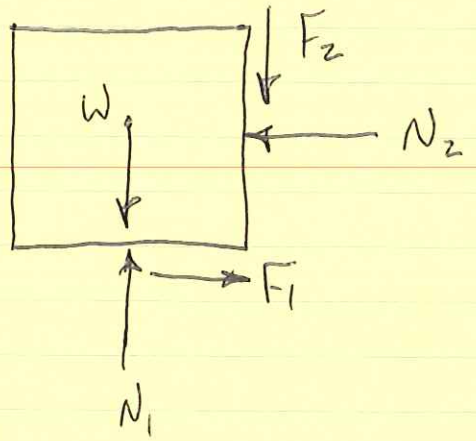
PROB. 8.65

FBD| 400 LB BLOCK:

$\mu_s = 0.25$

FIND P



$\Sigma F_x = 0: \quad F_1 = N_2$ (1)

$\Sigma F_y = 0: \quad N_1 - W - F_2 = 0$ (2)

$F_1 = \mu_s N_1, \quad F_2 = \mu_s N_2$

$\mu_s N_1 = N_2$ (1)

$N_1 - W - \mu_s N_2 = 0$ (2)

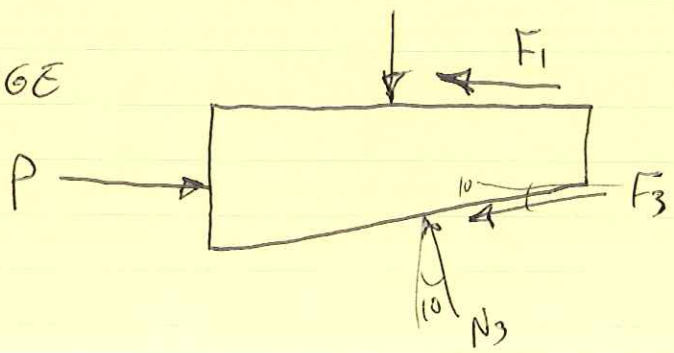
} COMBINE

$N_1 - W - \mu_s(\mu_s N_1) = 0$

$N_1(1 - \mu_s^2) = W$

$N_1 = \frac{W}{1-\mu_s^2} = \frac{400}{1-0.25^2} = 427^{LB}$

FBD| WEDGE



8.65

$\Sigma F_x = 0: \quad P - F_1 - F_3 \cos 10^\circ - N_3 \sin 10^\circ = 0$

$P = \mu_s N_1 + \mu_s N_3 \cos 10^\circ + N_3 \sin 10^\circ$

$P = (0.25)(427) + N_3 [(0.25)(\cos 10^\circ) + \sin 10^\circ]$

$P = 107 + 0.420 N_3$

$\Sigma F_y = 0: \quad -N_1 - F_3 \sin 10^\circ + N_3 \cos 10^\circ = 0$

$-\mu_s N_3 \sin 10^\circ + N_3 \cos 10^\circ = N_1$

$N_3 [-(0.25) \sin 10^\circ + \cos 10^\circ] = 427$

$N_3 = 453 \text{ LB}$

$P = 107 + 0.42(453) = 297 \text{ LB}$