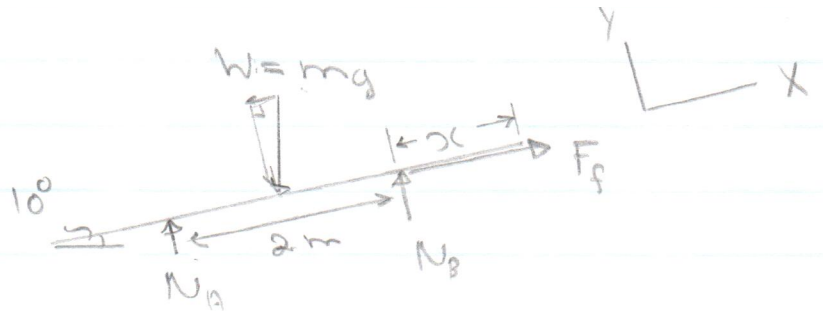


4A



(2)  $\uparrow \sum F_y = 0$

$$-2000 \cos 10^\circ + N_A + N_B = 0 \quad \text{--- ①}$$

$\rightarrow \sum F_x = 0: -2000 \sin 10^\circ + 0,6 N_B = 0$

$$\therefore N_B = 578,827 \text{ N}$$

$\therefore$  From ①:  $N_A = 1390,788 \text{ N}$

(b)  $\sum M_B = 0: -1390,788(2) + 2000 \cos 10^\circ (2-x) = 0$

$$\therefore x = 0,588 \text{ m}$$

(3)  $\leftarrow \sum F_x = 0$

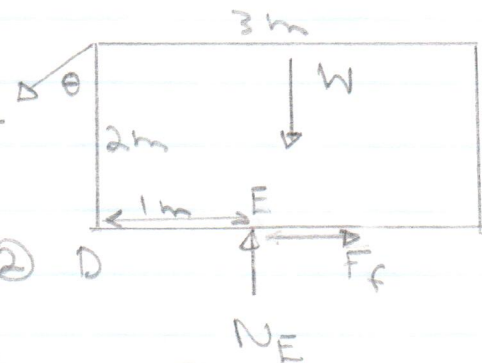
$$\therefore T \sin \theta - F_f = 0 \quad \text{--- ①}$$

$\uparrow \sum F_y = 0.$

$$\therefore -400 - T \cos \theta + N_E = 0 \quad \text{--- ②}$$

(c)  $\sum M_E = 0$

$$\therefore T \sin \theta (2) + T \cos \theta (1) - 400(0,5) = 0 \quad \text{--- ③}$$



(a)  $\theta = 90^\circ$ : From ③:  $T = 100 \text{ N}$

From ①:  $F_f = 100 \text{ N}$

From ②:  $N_E = 400 \text{ N}$

(b)  $\theta = 40^\circ$ : From ③:  $T = 97,5 \text{ N}$

From ①:  $F_f = 62,7 \text{ N}$

From ②:  $N_E = 474,7 \text{ N}$

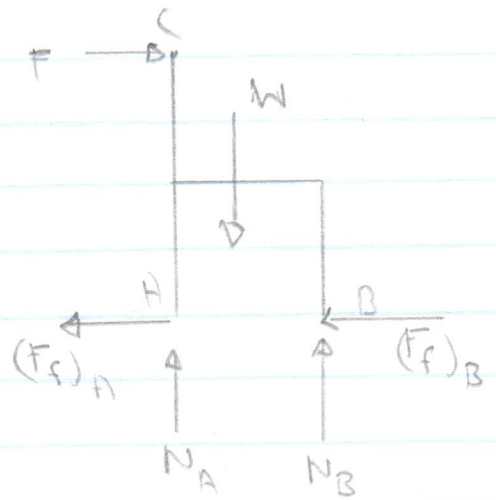
②

LB

(2)  $\Sigma M_c = 0$

$\therefore 50(0,2) + \mu N_B(1) - N_B(0,5) = 0 \text{ --- (1)}$

$\Sigma F_y = 0: N_A + N_B - 50 = 0 \text{ --- (2)}$



For the chair to topple  $N_A = 0$

$\therefore$  From (2)  $N_B = 50 \text{ N}$  and from (1)  $\mu = 0,3$

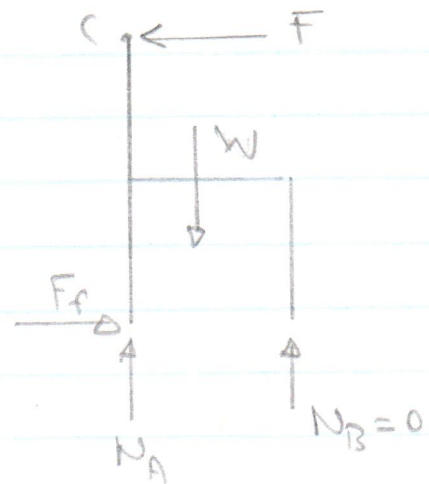
$\therefore \mu < 0,3$

A)  $\Sigma F_y = 0: N_A = 50 \text{ N}$

B)  $\Sigma M_c = 0$

$\therefore \mu 50(1) - 50(0,2) = 0$

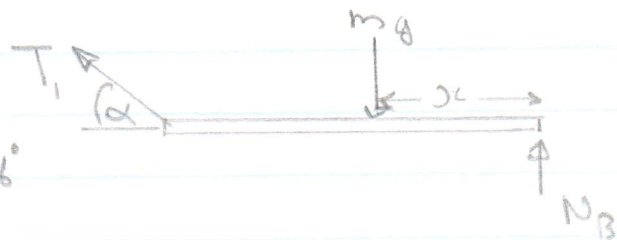
$\therefore \mu = 0,2$



$\therefore 0,2 < \mu < 0,3$

(3)  $\mu = 0,2$

$\alpha = \sin^{-1}(\frac{1,4}{5}) = 16,26^\circ$



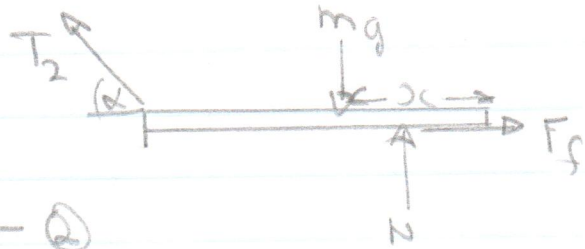
$\Sigma M_B = 0: T_1 \sin 16,26^\circ (5) - mgx = 0$

$T_1 = \frac{mgx}{\sin \alpha (5)} \text{ --- (1)}$

P.T.O.

③

$$\leftarrow \sum F_x = 0$$



$$T_2 \cos \alpha - \mu N = 0 \quad - \textcircled{2}$$

$$\uparrow \sum F_y = 0: T_2 \sin \alpha + N - mg = 0$$

$$\therefore N = mg - T_2 \sin \alpha \quad - \textcircled{3}$$

$$\text{Sub } \textcircled{3} \text{ into } \textcircled{2}: T_2 \cos \alpha - \mu mg + \mu T_2 \sin \alpha = 0$$

$$\therefore T_2 = \frac{0,2 mg}{\cos \alpha + 0,2 \sin \alpha} \quad - \textcircled{4}$$

Not to lift:  $T_2 < T_1$

$$\therefore \frac{0,2 mg}{\cos \alpha + 0,2 \sin \alpha} < \frac{mgx}{\sin \alpha (5)}$$

$$\therefore x > 0,276 \text{ m}$$