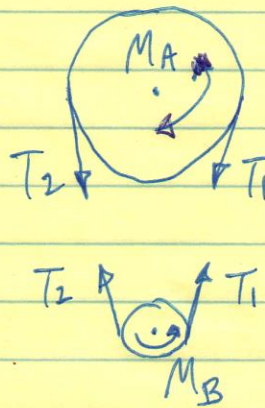PROB. 8.124

$\mu_S = 0.4$, $T_{MAX} = 450^N$, FIND M_A

IMPENDING MOTION ABOUT DRUM A

DRUM A: $\dfrac{T_2}{T_1} = e^{\mu_S \beta}$

$\beta = \pi + 2(15°)\left(\dfrac{\pi}{180°}\right) = 3.665^{RAD}$

$T_2 = T_{MAX}$

$T_1 = \dfrac{T_{MAX}}{e^{\mu_S \beta}} = \dfrac{(450^N)}{e^{(0.4)(3.665)}} = 104^N$

$\Sigma M_A = 0 \quad +\circlearrowleft:$

$-M_A - (0.12^m)(104^N) + (0.12^m)(450^N) = 0$

$M_A = +41.5^{N \cdot m}$

8.124 CONT.

DRUM B: $\quad \dfrac{T_2}{T_1} = e^{\mu_s \beta}$

$\beta = \pi - 2(15°)\left(\dfrac{\pi}{180°}\right) = 2.618 \ ^{RAD}$

$T_1 = \dfrac{T_{MAX}}{e^{\mu_s \beta}} = \dfrac{(450^N)}{e^{(0.4)(2.618)}} = 158^N$

$\Sigma M_B = 0: \ \overset{+\circlearrowleft}{}$

$M_B + \cancel{\text{correct}} (0.05^m)(158^N) - (0.05^m)(450^N) = 0$

$M_B = 14.6 ^{N \cdot m}$

BELT WILL SLIP AROUND DRUM B FIRST
BECAUSE $\quad M_B < M_A$