بسم الله الرحمن الرحيم

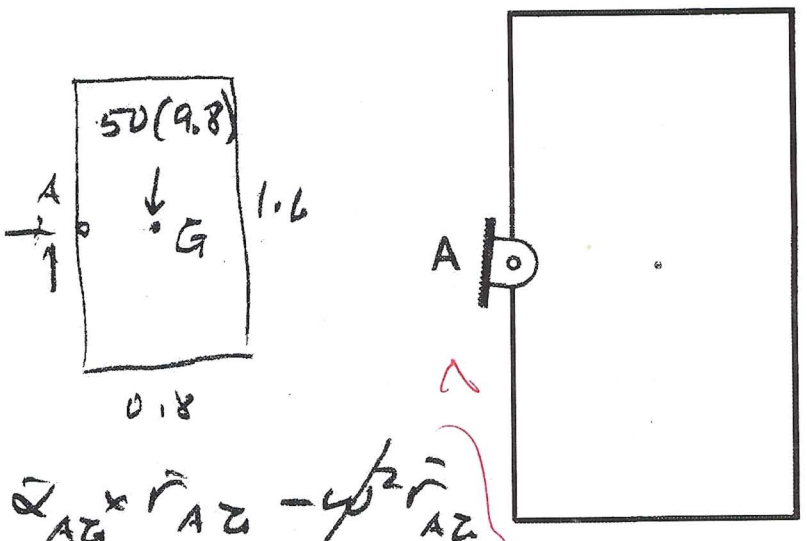
KING ABDULAZIZ UNIVERSITY - COLLEGE OF ENGINEERING

27 / 11 /1429(Fall 2008) **MENG 262 DYNAMICS** **Quiz # 5A**

Duration: 60 minutes

Name **Comp No.**

A 50-kg uniform plate 1.6 m in length and 0.8 m in width is released from rest at the position shown. Determine the angular acceleration of the plate and the reaction at A at this instant.



$\Sigma \bar{F} = m\bar{a}_G$

$A_x\bar{i} + A_y\bar{j} - 50(9.8)\bar{j} = 50\bar{a}_G$

where $\bar{a}_G = \bar{a}_A + \bar{\alpha}_{AG} \times \bar{r}_{AG} - \omega^2 \bar{r}_{AG}$

$\bar{a}_G = \alpha_{AG}\bar{k} \times 0.4\bar{i}$

Subst. back

$\bar{i}$ll $A_x = 50(0)$ $\rightarrow$ $A_x = 0$

$\bar{j}$ll $A_y - 50(9.8) = 50(0.4)\alpha_{AG}$ ---(1)

$\Sigma \bar{M}_A = I_A \bar{\alpha}$ where $I_A = I_G + md^2$

$I_A = \frac{50}{12}(0.8^2 + 1.6^2) + 50(0.4)^2 = 21.3$ kg-m^2

Subst back

$0.4\bar{i} \times 50(9.8)(-\bar{j}) = 21.3\,\alpha\,\bar{k}$

$\rightarrow$ $\alpha = -9.2$ rad/s^2

From (1) $A_y = -50(0.4)(9.2) + 50(9.8)$

$A_y = 306$ N