1) a. $V_x(5) = 20 - 4.5 = 20 - 20 = 0$

$V_y(5) = 20$

$\Rightarrow \vec{V}(5) = 20\hat{j}$ m/s

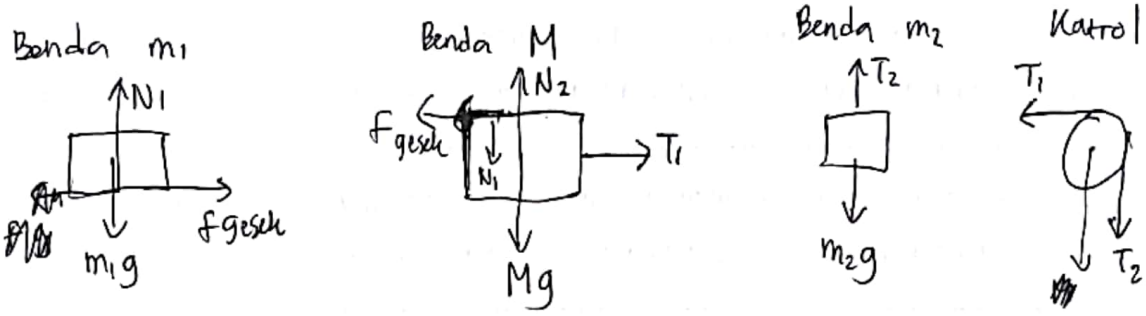
b. $\vec{r}(t) = (3 + 20t - 2t^2)\hat{i} + (4 + 20t)\hat{j}$

c. x_{max} tercapai ketika $t = \frac{-20}{2(-2)} = 5$ sekon

$\Rightarrow \vec{r}(5) = (3 + 20.5 - 2.5^2)\hat{i} + (4 + 20.5)\hat{j}$

$= 53\hat{i} + 104\hat{j}$

2) a.



b. * $T_2 \cdot R - T_1 R = I \cdot \frac{a}{R}$

$T_2 - T_1 = \frac{I \cdot a}{R^2}$

* $T_1 - f_{gesek} + m_2 g - T_2 = (M + m_2)a$

$m_2 g - \mu_s \cdot m_1 g - \frac{I \cdot a}{R^2} = (M + m_2)a$

$m_2 g - \mu_s m_1 g = \left(M + m_2 + \frac{I}{R^2}\right)a$

$a = \frac{g(m_2 - \mu_s m_1)}{M + m_2 + \frac{I}{R^2}}$

* $f_{gesek} = m_1 a$

$\mu_s m_1 g = m_1 a$

$\mu_s g = a$

$\mu_s g = \frac{g(m_2 - \mu_s m_1)}{M + m_2 + \frac{I}{R^2}}$

$\mu_s M + \mu_s \cdot m_2 + \mu_s \frac{I}{R^2} = m_2 - \mu_s \cdot m_1$

$\mu_s M + \mu_s \frac{I}{R^2} + \mu_s \cdot m_1 = m_2 - \mu_s \cdot m_2$

$\mu_s \left(M + m_1 + \frac{I}{R^2}\right) = m_2 (1 - \mu_s)$

$m_2 = \frac{\mu_s \left(M + m_1 + \frac{I}{R^2}\right)}{1 - \mu_s}$

3) a. * $P = \frac{W_{AB}}{t}$

$75 = \frac{W_{AB}}{2}$

$W_{AB} = 150$

$EK_B - EK_A = 150$

$EK_B - \frac{1}{2} m v_A^2 = 150$

$EK_B - \frac{1}{2} \cdot 100 \cdot 1 = 150$

$EK_B = 200$ Joule

* $W_{AB} = 150$

$F \cdot S_{AB} = 150$

$F \cdot 3 = 150$

$F = 50$ Newton

b. $EK_B + EP_B = EK_C + EP_C$

$200 + 0 = \frac{1}{2} m v_C^2 + m \cdot g \cdot h_C$

$200 = \frac{1}{2} \cdot 100 \, v_C^2 + 100 \cdot 10 \cdot 2$

$200 = 50 v_C^2 + 200$

$W_{gesek} = 50 \cdot 5 = 250$ J

4) a. * $\frac{1}{2} m_1 v_1^2 = m_1 g h_1$

$\frac{1}{2} v_1^2 = g h_1$

$v_1^2 = 2 g h_1$

$v_1^2 = 20$

$v_1 = 2\sqrt{5}$ m/s

* Elastis : $v_1 - v_2 = v_2' - v_1'$

$v_1 = v_2' - v_1'$

H. kekekalan momentum :

$m_1 v_1 + m_2 v_2 = m_1 v_1' + m_2 v_2'$

$1{,}5 \cdot (2\sqrt{5}) + 0 = 1{,}5 v_1' + (0{,}5)(2\sqrt{5} + v_1')$

$3\sqrt{5} = 1{,}5 v_1' + \sqrt{5} + 0{,}5 v_1'$

$2\sqrt{5} = 2 v_1'$

$v_1' = \sqrt{5}$ m/s , $v_2' = 2\sqrt{5} + \sqrt{5} = 3\sqrt{5}$ m/s

b. * $\frac{1}{2} m_2 v_2''^2 = m_2 g h_2$

$v_2''^2 = 2 g h_2$

$v_2''^2 = 2 \cdot 10 \cdot 0{,}2$

$v_2''^2 = 4$

$v_2'' = 2$ m/s

~~$v_{ty}^2 = v_{oy}^2 - 2$~~

* Pada titik tertinggi, $V_y = 0$ dan $V_x = V_{ox} \cdot t$

$= 2 \cos 30^\circ \cdot t = t\sqrt{3}$.

$\Rightarrow V_y = V_{oy} - g \cdot t$

$0 = 2 \sin 30^\circ - 10t$

$10t = 1$

$t = 0{,}1$ sekon

$\Rightarrow V_x = 0{,}1\sqrt{3}$ m/s

$\Rightarrow V = \sqrt{V_x^2 + V_y^2} = 0{,}1\sqrt{3}$ m/s

a. c. $I = \Delta p$

$= m_2 v_{akhir} - m_2 v_{awal}$

$= m_2\left(-\frac{1}{2} \cdot 0{,}1\sqrt{3} - 0{,}1\sqrt{3}\right)$

$= 0{,}5\left(-\frac{3}{2} \cdot 0{,}1\sqrt{3}\right)$

$= -\frac{3}{40}\sqrt{3}$ kg.m.s^{-1}

5) a. $x = \frac{m_A x_A + m_B x_B}{m_A + m_B} = \frac{M(0) + 2M(0)}{M+2M} = 0$

$y = \frac{m_A y_A + m_B y_B}{m_A + MB} = \frac{M\left(\frac{D}{2}\right) + 2M\left(-\frac{D}{2}\right)}{M+2M} = \frac{\frac{MD}{2} - MD}{3M} = \frac{\left(-\frac{MD}{2}\right)}{3M} = -\frac{D}{6}$

Pusat ~~massa~~ massa : $\left(0, -\frac{D}{6}\right)$

b. $I = \sum m_i r_i^2 = m_A r_A^2 + m_B r_B^2 = M\left(\frac{D}{2}\right)^2 + 2M\left(\frac{D}{2}\right)^2 = \frac{MD^2}{4} + \frac{MD^2}{2} = \frac{3MD^2}{4}$

c. $\Sigma \tau = I.\alpha$

$F.\frac{D}{2} = \frac{3MD^2}{4}.\alpha$

$\alpha = \frac{2F}{3MD}$