Solución Parcial

$m_1 = m_2 = m$

$v_{tx} = \frac{x}{t} = \frac{3m}{3s} = 1\,m/s$ b) Velocidad Posterior al choque

$v_{i1}\,m + v_{i0}\,m = 2m\,(1\,m/s)$

$v_{i1} = 2\,(1\,m/s) = 2\,m/s$ la velocidad de m1 antes del choque.

c) Por energías

$mgR = \frac{1}{2}mv^2$

$R = \frac{1}{2}\frac{v^2}{g} = \frac{2}{g} \approx 0{,}2\,m.$

d) $y_f = y_0 + v_{yt} - \frac{1}{2}gt^2$

$y_0 = \frac{1}{2}gt^2 \approx 45\,m.$

PROBLEMA 2

$\frac{1}{2}kx^2 = mgR + \frac{1}{2}mv_B^2$

$\frac{1}{2}kx^2 = 2mgR + \frac{1}{2}mgR$

$\frac{1}{2}kx^2 = \frac{5}{2}gR$

$x_{min} = \sqrt{\frac{5gR}{k}} = \sqrt{\frac{5gR}{k}}$

$-N - mg = -\frac{mv_B^2}{R}$

$v_B^2 = mgR$

b) $\frac{1}{2}kx^2 = \frac{1}{2}\left(\frac{N}{m}\right)\left(\frac{5gR}{k}\right) \approx \frac{1}{2}\frac{5 \cdot 10 \cdot 5}{10 \cdot 2} = 12.5\,J$

$\frac{1}{2}mv^2 = \frac{1}{2}kx^2$

$v^2 = k\left(\frac{5gR}{k}\right)\frac{1}{m} = \frac{5g's}{10}\cdot\frac{1}{1} = 25 \rightarrow 5m/s = V.$

(3)

b) $m_1 v_{1x} + m_2 v_{2x} = (m_1 + m_2) v_{tx}$

$m_1 v_{1y} + m_2 v_{2y} = (m_1 + m_2) v_{ty}$

Reemplazando

$m_1(4) + m_2(-1) = 5\, v_{tx}$

$8 - 3 = 5\, v_{tx} \rightarrow v_{tx} = 1\ m/s$

$2kg(3) + 3(2) = v_{ty}(5)$

$\frac{12}{5} = v_{ty}$

c)

d) antes del choque y despues del choque
Vcm es la misma

$$\vec{V}_{cm} = \left(1\,\hat{i} + \frac{12}{5}\,\hat{j}\right) m/s$$

e) $|\vec{V}_1|_i^2 = 25 \qquad |\vec{V}_2|_i^2 = 5$

antes del choque

$$E_i = \frac{1}{2}(2)\,25 + \frac{1}{2}(3)\,5 = 25 + 7{,}5 = 32.5\,J$$

$$E_f = \frac{1}{2}(5)\left(1 + \frac{144}{25}\right) = \frac{1}{2}\,5 \cdot \left(\frac{169}{25}\right) = \frac{169}{10} = 16{,}9\,J$$

$$\Delta E = E_i - E_f = (32.5 - 16{,}9)\,J = 15{,}4\,J.$$