TAM 203
Homework Solutions

Due 2/21/08

9.87

Given: $v_0 = 2.6\ m/s$, $e = 0.8$, $m_A = 2\ kg$, $m_B = 0.5\ kg$

We have the equations:

$$m_A v_0 = m_A v_A + m_B v_B$$

$$-e v_0 = v_A - v_B$$

In matrix form,

$$\begin{bmatrix} m_A & m_B \\ 1 & -1 \end{bmatrix} \begin{pmatrix} v_A \\ v_B \end{pmatrix} = \begin{pmatrix} m_A v_0 \\ -e v_0 \end{pmatrix}$$

OR

$$\begin{bmatrix} 2 & 0.5 \\ 1 & -1 \end{bmatrix} \begin{pmatrix} v_A \\ v_B \end{pmatrix} = \begin{pmatrix} 5.2 \\ -2.08 \end{pmatrix}$$

$$\left[\begin{array}{cc|c} 2 & 0.5 & 5.2 \\ 1 & -1 & -2.08 \end{array}\right] \rightarrow \left[\begin{array}{cc|c} 1 & 0.25 & 2.6 \\ 0 & -1.25 & -4.68 \end{array}\right] \rightarrow \left[\begin{array}{cc|c} 1 & 0 & 1.664 \\ 0 & -1.25 & -4.68 \end{array}\right]$$

$$\rightarrow \left[\begin{array}{cc|c} 1 & 0 & 1.66 \\ 0 & 1 & 3.74 \end{array}\right] \rightarrow \boxed{\begin{aligned} v_A &= 1.66\ m/s \\ v_B &= 3.74\ m/s \end{aligned}}$$