

Answers P 1050 Final Exam Fall 2007

- 1 (a) (i) B is a stable equilibrium
 1 (a) (ii) $F_A > 0$, $F_B = 0$, $F_C < 0$
 1 (a) (iii) $|F_A|$ is the greatest because the slope is the greatest

- 1 (b) (i) $195 \text{ k kgm}^2/\text{s}$
 1 (b) (ii) 202.8 kgm^2
 1 (b) (iii) 0.277 rad/s

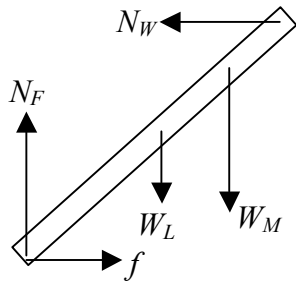
- 2 (a) 2.08 J
 2 (b) 0.913 m/s
 2 (c) 2.08 J
 2 (d) 0.553 s
 2 (e) 0.505 m

- 5 (a) 9.02 m/s , 46.1° below the positive x axis.
 5 (b) $3.75 \text{ i} + 6.50 \text{ j m/s}$, $6.25 \text{ i} - 6.50 \text{ j m/s}$
 5 (c) $625 \text{ i} - 650 \text{ j kgm/s}$
 5 (d)

$$\vec{v}_{cm-i} = \frac{m\vec{v}_{1-i} + m\vec{v}_{2-i}}{m+m} = \frac{m(10.0\text{i}) + m(0)}{m+m} = 5.00\text{i m/s}$$

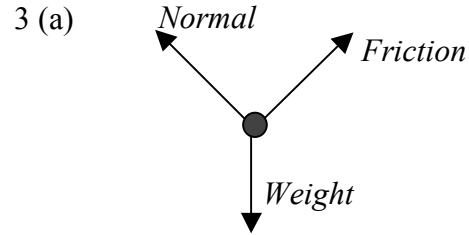
$$\vec{v}_{cm-f} = \frac{m\vec{v}_{1-f} + m\vec{v}_{2-f}}{m+m} = \frac{m(3.75\text{i} + 6.50\text{j}) + m(6.25\text{i} - 6.50\text{j})}{m+m} = \frac{m(3.75\text{i}) + m(6.25\text{i})}{m+m} = \frac{m(10.0\text{i})}{m+m} = 5.00\text{i m/s}$$

- 6 (a)



- 6 (b) 360 N
 6 (c) $N_F = 834 \text{ N (up)}$, $f = 360 \text{ N (right)}$

- 2 (f) $0.913 \text{ i} - 5.42 \text{ j m/s}$



- 3 (b) 14135 N
 3 (c) 7.46 m/s

- 4 (not physically realistic) – omit

- 7 (a) 1.19 kgm^2
 7 (b) (i) $E_i = E_f \rightarrow mg(0.4\cos 50) = K_r$
 $\rightarrow K_r = 8.1 \text{ J}$

- 7 (b) (ii) 3.68 rad/s
 7 (b) (iii) 1.47 m/s
 7 (c) 10.6 m/s^2

- 8 (a) 750 N/m
 8 (b) 22.4 rad/s
 8 (c) 0.0200 m
 8 (d) 0.447 m/s
 8 (e) 10.0 m/s^2 , $x = \pm 0.0200 \text{ m}$
 8 (f) 0.150 J
 8 (g) 0.0550 s
 8 (h) 0.422 m/s