Solutions

PHYS-205A-001 (Final Exam) Spring 2026

Problem 1

No, it is not zero. Acceleration is second derivative of position, or change in velocity. Visually it is proportional to curvature.

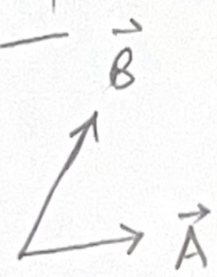
Problem 2

Radially inward, towards center of circle.

Problem 3

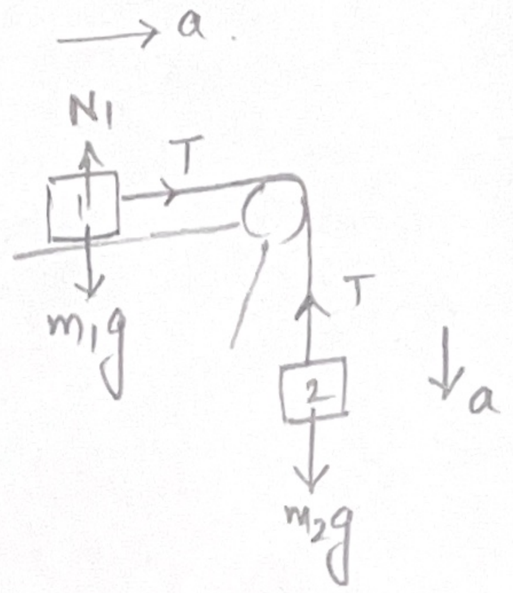
Zero. Gravity is a conservative force.

Problem 4



$\vec{C}$ is coming out of paper, using Right Hand Rule.

Problem 5



m_2: $m_2 a = m_2 g - T$

m_1 in x: $m_1 a = T$

$(m_1 + m_2)\, a = m_2 g$

$a = \dfrac{m_2 g}{m_1 + m_2}$

$T = m_1 a$

$= \dfrac{m_1 m_2 g}{m_1 + m_2} = \dfrac{(1.0)(2.0)(9.8)}{(1.0 + 2.0)}$

$= 6.5$ Newton.

Problem 6

$$I = m_1 r_1^2 + m_2 r_2^2 + m_3 r_3^2 + m_4 r_4^2 + m_0 r_0^2$$

$$= m_2 r_2^2 + m_4 r_4^2 \qquad (r_1 = 0,\ r_3 = 0,\ r_0 = 0)$$

$$= (2.0)(0.10)^2 + (4.0)(0.10)^2$$

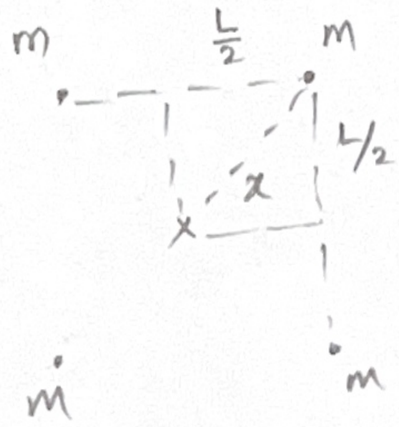
$$= 6.0 \times 10^{-2}\ \text{kg m}^2$$

Problem 7

$$V = 4\,\frac{Gm}{x}$$

$$= 4\,\frac{Gm}{\left(\frac{L}{\sqrt{2}}\right)}$$

$$= 4\sqrt{2}\,\frac{Gm}{L}$$



$$x = \sqrt{\left(\frac{L}{2}\right)^2 + \left(\frac{L}{2}\right)^2}$$

$$= \frac{L}{\sqrt{2}}$$