Phys 218 – Spring 2018

All *University Physics* Sections

Exam III

Short Answers:

A) (a) $I_{\text{tot}} = \frac{3}{2}mb^2$ [LO 51.1, 52.1, 52.2, 53.1, 53.2]

(b) $I_{\text{tot}} = \frac{2}{5}MR^2 + M(R+L)^2 + \frac{1}{3}mL^2$ [LO 51.2, 51.3, 52.3, 53.3]

B) (a) It is not possible because the torque from the applied force is zero since it points at the corner of the curb [LO 54.1, 55.1]

(b) Yes it can, if $F > mg$ [LO 54.2, 55.2]

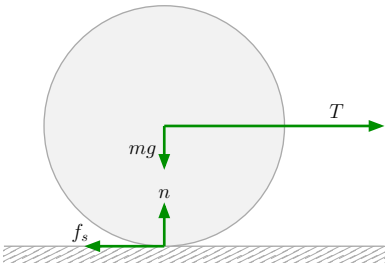
C) (a) i. During the collision: linear momentum (in horizontal direction) and angular momentum are conserved; mechanical and kinetic energy are not [LO 40.1, 48.1, 50.1, 59.1]

ii. After the collision: mechanical energy is conserved; linear momentum, angular momentum or kinetic energy are not conserved [LO 39.3, 40.2, 48.2, 59.2]

(b) Angular momentum is conserved; linear momentum, mechanical energy and kinetic energy are not [LO 40.3, 48.3, 50.2, 59.3]

D) $\tau_{\text{tot}} = (1.6 - 0.6\cos 30°) = (1.6 - 0.3\sqrt{3})$ N m in CCW direction, or out of the page [LO 2.1, 2.2, 2.3, 2.4, 54.3, 54.4, 54.5]

Problem 1: (a) [LO 23.1, 24.1, 26.1, 27.1]



(b) $f_s = \frac{2}{7}T$ [LO 4.1, 6.1, 21.1, 51.4, 55.3]

Problem 2: (a) No it is not elastic. Yes, the total momentum is conserved [LO 48.4, 50.3]

(b) $v_0 = \left(1 + \frac{M}{m}\right)\sqrt{\frac{kd^2}{m+M} + 2\mu_k g d}$ [LO 4.2, 26.2, 28.1, 32.1, 34.1, 34.2, 38.1, 39.1, 39.2, 48.5]

Problem 3: (a) $|\omega_f| = \dfrac{|mv_0R - I\omega_0|}{I + mR^2}$ [LO 3.1, 53.4, 57.1, 57.2, 57.3, 59.4]

(b) i. $K_i = \frac{1}{2}(mv_0^2 + I\omega_0^2)$ [LO 34.3, 35.1]

ii. $K_f = \frac{1}{2}(I + mR^2)\omega_f^2 = \dfrac{|mv_0R - I\omega_0|^2}{2(I + mR^2)}$ [LO 35.2]