

1. AP 2010 #1 (Linearization)
2. A net torque of 26.0 [Nm] acts on a wheel and causes an angular acceleration 21.0 [rad/s²], what is the wheel's rotational inertia?
3. The velocity of an object as a function of time is given by $v(t) = 2/(4+6t)$ [m/s]. What is the change in position of the object from time 2 [s] to 7 [s]?
4. A centrifuge rotor rotating at 7,000 [rpm] is shut off and is eventually brought uniformly to rest (i.e. constant deceleration) by a frictional torque of 0.90 [Nm].
 - a. If the mass of the rotor is 4.80 [kg] and it can be approximated as a solid cylinder of radius 0.0710 [m], through how many revolutions will the rotor turn before coming to rest?
 - b. How long will it take to bring the rotor to rest?
5. The gravitational potential energy function of an object on planet Surium is $U(x) = 191/(2 + x)$ [J]. What force is acting on the object when it is 3 [m] above the surface of planet Surium?
6. A particle moves in a circle in such a way that the x and y coordinates of its motion are given as functions of time below. Assume that the positive x direction is to the right and the positive y direction is up.

$$x(t) = 6 \cos (3t)$$

$$y(t) = 6 \sin (3t)$$

where x and y are in meters and t is in seconds

- a. What is the radius of the circle?
- b. What is the maximum velocity of the particle?
- c. What is the minimum velocity of the particle?

HW Set 4 Answers

1. Will discuss in class
2. 1.23 [kg·m²]
3. 0.352 [m]
- 4a. 575 [rev]
- 4b. 9.85 [s]
5. 7.64 [N]
- 6a. 6 [m]
- 6b. 18 [m/s]
- 6c. -18[m/s]