

MC (50) = \_\_\_\_\_ Prob 11 (20) = \_\_\_\_\_ Prob 12 (15) = \_\_\_\_\_ Prob 13 (15) = \_\_\_\_\_ Total = \_\_\_\_\_

**Multiple choice, circle the correct answer (5 pts each).**

1. A bicycle wheel has a moment of inertia of  $3.4 \text{ kg}\cdot\text{m}^2$ . A torque of  $1.7 \text{ N}\cdot\text{m}$  is applied to the wheel to slow it to a stop. If it takes 11.2 seconds for the wheel to come to a stop, what was the initial angular speed of the wheel?
  - (a) 5.6 rads/s
  - (b) 22.4 rads/s
  - (c) 11.2 rads/s
  - (d) 1.9 rads/s
  - (e) 16.8 rads/s
  
2. The angular momentum of an object traveling with constant speed in a straight line:
  - (a) Is always zero.
  - (b) Can be non-zero. It depends upon the point about which you calculate angular momentum.
  - (c) Can be non-zero, and as the ball moves its angular momentum changes.
  - (d) You can't calculate angular momentum for such objects.
  
3. The net torque acting on a body is zero. Which one of the answers below is correct?
  - (a) The object must be at rest. It cannot be moving or rotating.
  - (b) If it is rotating, it must be rotating with constant speed.
  - (c) If the object is moving (translating), it must be moving in a straight line with constant speed.
  - (d) We can't tell anything about the translation of the center of the mass of the object, but we know the object is not rotating.
  
4. A star in outer space collapses to a smaller radius. Before collapsing, it was spinning with constant angular speed. At all times, the star is of uniform density (think of it as a sphere of constant density). After collapsing, its radius is smaller by a factor of 2. What happens to its rotational speed?
  - (a) The rotational speed is  $\sqrt{2}$  times slower.
  - (b) The rotational speed is twice as large.
  - (c) The rotational speed is four times larger.
  - (d) The rotational speed is a factor of 2 slower.
  - (e) The rotational speed is 16 times faster.

5. A square merry-go-round (8 m on a side) is pushed at two corners by the forces shown. The net torque on the merry-go-round is closest to:

- (a) 11.3 N-m into the page
- (b) 8 N-m into the page
- (c) 32 N-m into the page
- (d) 8 N-m out of the page
- (e) 11.3 N-m out of the page

