Review for Test #3

- Responsible for:
  - Chapters 9, 10, 11, and 12 (except 9.5, 10.5, 11.6, 12.4, 12.10-12), also Chapters 1-8, 13.4
  - Problems worked in class and notes
  - Homework assignments

- Test format:
  - 4 probs (15 points each), 1 prob (30 pts), bonus (5 pts)
  - Set of conceptual questions, 10 pts
  - Time: 75 minutes

- Test materials:
  - Pencil, eraser, calculator, student ID
  - No formulae sheet or paper, Closed text and notes

Material Covered

- Chapter 9: Work and Energy
- Kinetic energy, work, work integral
– work-energy theorem, scalar products
- spring force, work due to the spring
- integrals (sec. 2.3), graphical interpretation, derivations with integrals

- Chapter 10: Interactions and Potential Energy
- gravitational and spring potential energy
- Conservative and non-conservative forces
- Conservative forces and potential energy
- Conservation of energy, with non-conservative work

❑Chapter 11: Impulse and Momentum

- Impulse-momentum theorem and integrals
- 1D and 2D collision problems
- center of mass
- elastic and inelastic collisions

❑ Chapter 12:Rotational Dynamics

- Torque, Newton's 2nd Law $\Sigma\tau=I\alpha$
- Moment of inertia
- Rotational work and kinetic energy
- Conservation of Energy with rotation
- Rolling motion (tire)
- static equilibrium with torque
- center of gravity

Example Problem

- A trapeze artist of mass *m* swings on a rope of length *L*. Initially, the trapeze artist is at rest and the rope makes an angle of θ with the vertical. (a) Find the tension in the rope when it is vertical. (b) Explain why your results for part (a) depends on *L*.

Example Problem

- An ice cube of mass *m* is placed on top of an overturned spherical bowl of radius *r*. If the ice cube slights downward from rest at the top of the bowl, at what angle θ does it leave the surface of the bowl?

Example Problem (Chap. 9)

The electric company bills you in “kilowatt hours”, abbreviated kWh.

a) Is this energy, power, or force?

b) Monthly electric use of a typical household is 500 kWh. What is this in basic SI units?

c) What is the average power usage?