## Physics 20, Fall 2011 Homework Set 4 Due: 5pm Monday, October 24, 2011

Turn homework into the Phys 20 box on the 2nd floor of Broida Hall, directly in front of the elevators. (It's labeled with the names of the professor and TA.)

Problem "KK" stands for "Problem in Kleppner & Kolenkow, pp.103-109".

Please show your work, and write neatly.

DME 10/17/11

1. KK 2.2

2. KK 2.3



Figure 1: Problem 3.

3. (a) Two 10-lb weights are attached to a spring scale of negligible mass with cord of negligible mass as shown in Fig. 1(a). What is the reading of the scale (in pounds)?

(b) A single 10-lb weight is attached to the spring scale which itself is attached to a wall with cord of negligible mass, as shown in Fig. 1(b). What is now the reading of the scale?



Figure 2: Problem 4.

- 4. A chain consisting of five links, each with mass 100 g, is lifted vertically with a constant acceleration of 2.5 m/s<sup>2</sup>, as shown in Fig 2. Find:
  - (a) the forces acting between adjacent links,
  - (b) the force F exerted on the top link by the agent lifting the chain, and
  - (c) the *net* force on each link.





- 5. Figure 3 shows a section of an alpine cable-car system. The maximum permitted mass of each car with occupants is 2800 kg. The cars, riding on a support cable, are pulled by a second cable attached to a connection at the top of each car. The force of the support cable on the wheel above each car is perpendicular to the direction of the support cable, and the forces applied by the pull cables are parallel to that direction. The angle  $\theta = 35^{\circ}$  as shown, and the cars accelerate up the incline at  $a_{\theta} = 0.81 \text{ m/s}^2$ .
  - (a) What is the difference in tension between adjacent sections of pull cable?
  - (b) What is the magnitude of the force of the support cable on the wheel?
- 6. KK 2.16.