

CE 201 STATICS (Sections 4 & 6)

First Semester 1429-30 / 2008-09 (081)

H.W. # 3

Due on Sunday 4-11-1429 / 2-11-2008 (any time)

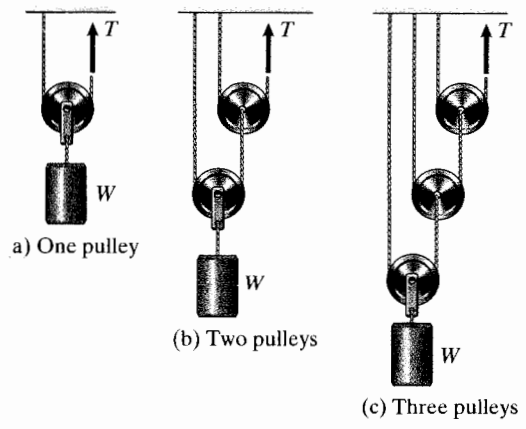
Deadline for submission: **Monday 5-11-1429 / 3-11-2008 (before you sit in class)**

- 1- Pulley systems containing one, two, and three pulleys are shown in Fig. P1. Neglecting the weights of the pulleys, determine the force T required to support the weight W in each case. [Secs. 3.1 - 3.3] (15 pts.)
- 2- Figure P2 shows an airplane flying in the vertical plane and its free-body diagram. The forces acting on the airplane are its weight W , the thrust T exerted by its engines, and aerodynamic forces resulting from the pressure distribution on the airplane's surface. The dashed line indicates the path along which the airplane is moving. The aerodynamic forces are resolved into a component perpendicular to the path, the lift L , and a component parallel to the path, the drag D . The angle γ between the horizontal and the path is called the flight path angle, and α is the angle of attack. If the airplane remains in equilibrium for an interval of time, it is said to be in steady flight. If $\gamma = 6^\circ$, $D = 125$ kN, $L = 680$ kN, and the mass of the airplane is 72,000 kg, what values of T and α are necessary to maintain steady flight? [Secs. 3.1 - 3.3] (15 pts.)
- 3- The two springs shown in Fig. P3 have the same unstretched length, and the inclined surface is smooth. Show that the magnitudes of the forces exerted by the two springs are [Secs. 3.1 - 3.3] (15 pts.)

$$F_1 = W \sin \alpha / (1 + k_2/k_1),$$

$$F_2 = W \sin \alpha / (1 + k_1/k_2).$$
- 4- The system of cables shown in Fig. P4 suspends a 1000-lb bank of lights. [Secs. 3.1 - 3.3] (30 pts.)
 - a) Determine the tensions in cables AB , CD , and CE .
 - b) If a technician changes the position of the lights by removing the cable CE , what is the tension in cable AB after the change?
- 5- As shown in Fig. P5, cable AB is attached to the top of the vertical 3-m post, and its tension is 50 kN. What are the tensions in cables AO , AC , and AD ? [Sec. 3.4] (25 pts.)

Fig. P1



Do your work yourself!! Remember that the homework carries about 15% of the course grade; in addition, solving it is the best way to understand the subject. Of course, you can seek my help anytime in the homework as well as in anything else.

As an engineer, review the guidelines for submitting homework assignments given to you in class BEFORE you start solving and writing the homework. FOLLOW ALL THESE GUIDELINES. Cheating, copying, etc. is

Fig. P2

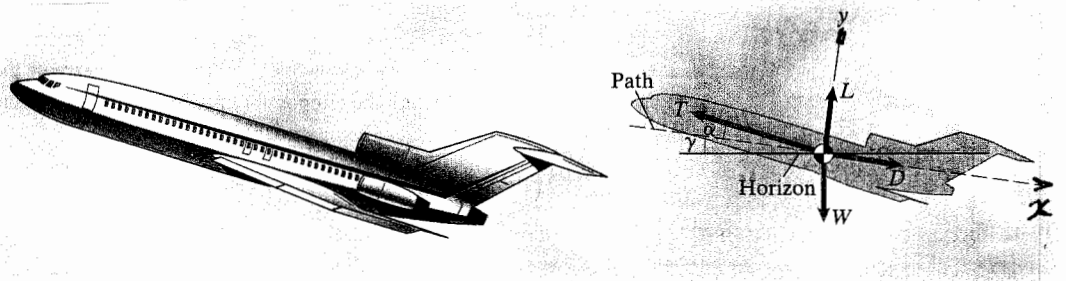


Fig. P3

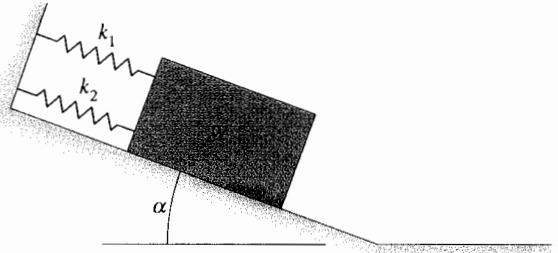


Fig. P4

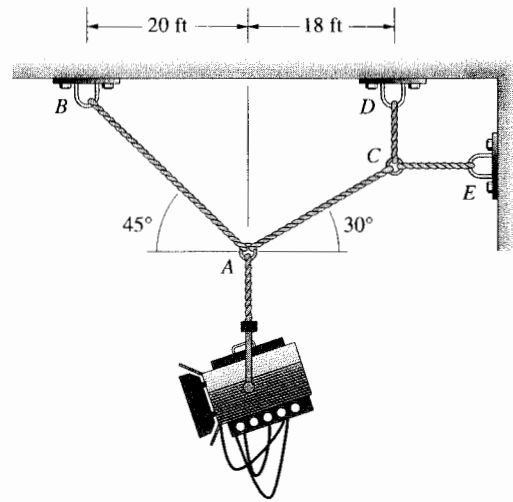


Fig. P5

