King Fahd University of Petroleum & Minerals
CIVIL ENGINEERING DEPARTMENT

CE 201 STATICS (Sections 3 & 4)

First Semester 1430-31 / 2009-10 (**091**)

H.W. # 3

Due on Sunday 6-11-1430 / 25-10-2009 **(any time)**

Deadline for submission: **Monday 7-11-1430 / 26-10-2009** (**before you sit in class**)

1- The forces acting on the airplane shown in Fig. P1 are its weight *W*, the thrust *T* exerted by its engines, and aerodynamic forces. 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 $\gamma = 6°$, $D = 125$ kN, $L = 680$ kN, and the mass of the airplane is 72 Mg (megagrams), what values of *T* and α are necessary to maintain steady flight? [Secs. 3.1 - 3.3] (15 pts.)

2- In Fig. P2 shown, the force $F_1 = 100$ lb.
   (a) What is the smallest value of F_3 for which the free-body diagram can be in equilibrium?
   (b) If F_3 has the value determined in part (a), what is the angle α?

   Hint: Draw a vector diagram of the sum of the three forces. [Secs. 3.1 - 3.3] (20 pts.)

3- The weight of the two blocks, shown in Fig. P3, are $W_1 = 200$ kN and $W_2 = 50$ kN. Neglecting the friction, determine the force the man must exert to hold the blocks in place. [Secs. 3.1 - 3.3] (20 pts.)

4- The unstretched length of the spring *AB*, shown in Fig. P4, is 660 mm, and the spring constant $k = 1000$ N/m. What is the mass of the suspended object? [Secs. 3.1 - 3.3] (20 pts.)

5- The bulldozer, shown in Fig. P5, exerts a $\mathbf{F} = 2\mathbf{i}$ (kip) at *A*. What are the tensions in cables *AB*, *AC*, and *AD*? [Sec. 3.4] (25 pts.)

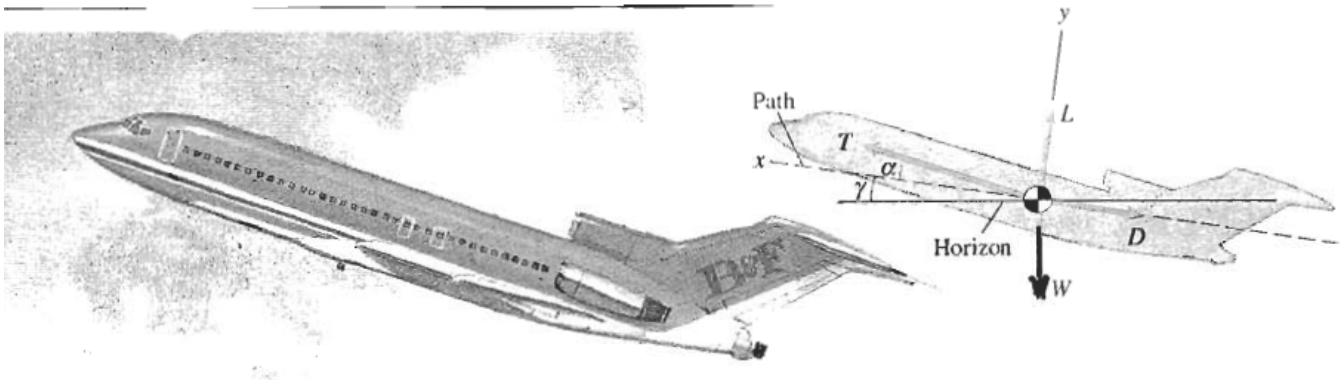

Fig. P1

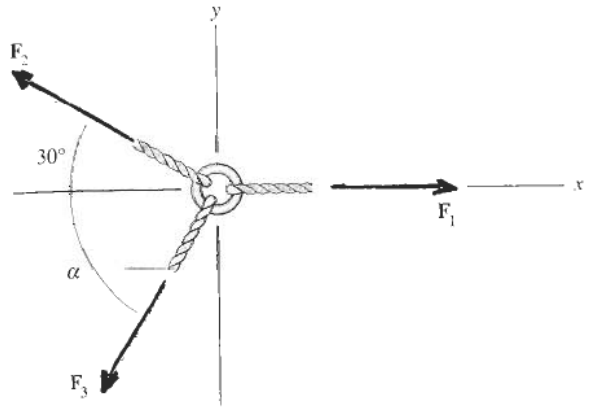

Fig. P2

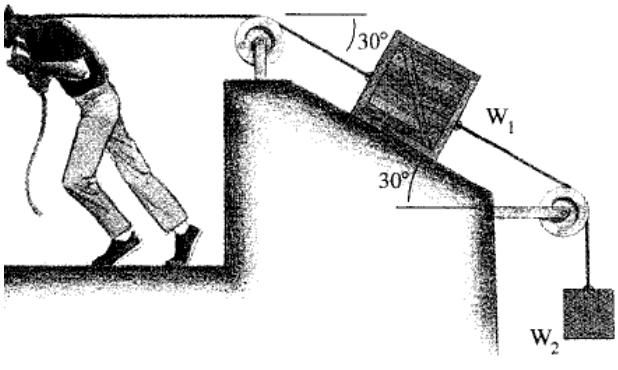

Fig. P3

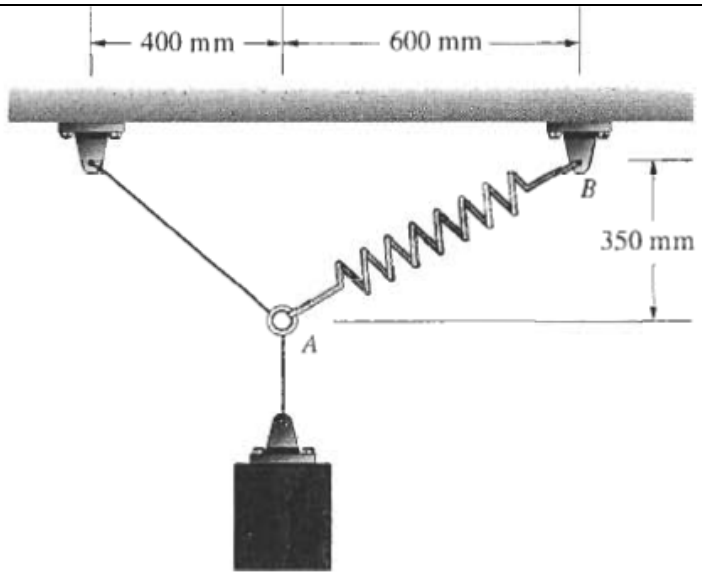

Fig. P4

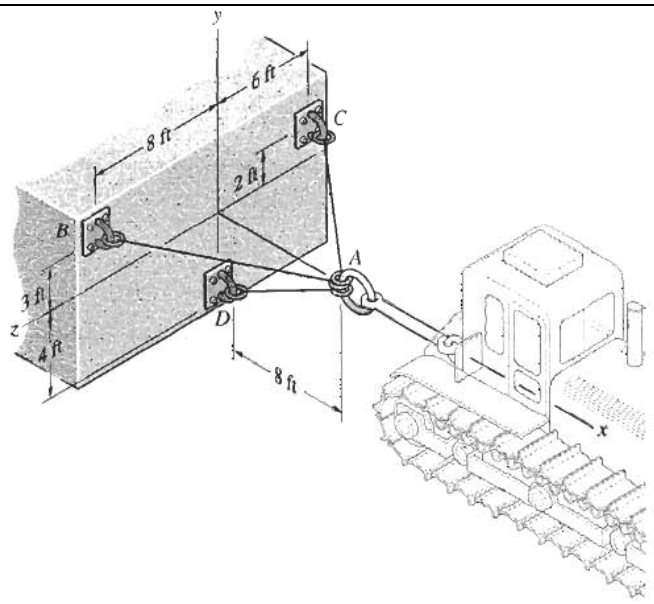

Fig. P5

Do <u>your</u> work *<u>yourself</u>*!! Remember that the homework carries more than 10% 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 <u>engineer</u>*, review the <u>guidelines for submitting homework assignments</u> given to you in class <u>BEFORE</u> you start solving and writing the homework. FOLLOW <u>*ALL*</u> THESE GUIDELINES. <u>*Cheating, copying, etc. is …….!!!!!!*</u>**