TAM 210/211 Written Assignment 2 (due Thursday, Feb 15th)

The **OBJECTIVE** of this written assignment is to practice **drawing free-body diagram (FBD)** and **writing equations of equilibrium (EoE)**.

DIRECTION: Draw a free body diagram of the specified body/bodies, and write the corresponding equations of equilibrium for the diagram. DO NOT SOLVE THE PROBLEM.

General "Written Assignment Instructions" applies. Additional grading criteria includes: 1) Clearly identified body of interest; 2) properly labeled external forces on the body; 3) geometry of the forces; 4) coordinate system; 5) variables in EoE correspond to FBD.

Sample Problem: The cord BD can support a maximum load of T. Perform equilibrium analysis on pulley B for determining the maximum weight of the crate, and the angle θ for equilibrium. Assume the mass of the pulley is negligible.


Sample FBD Solution
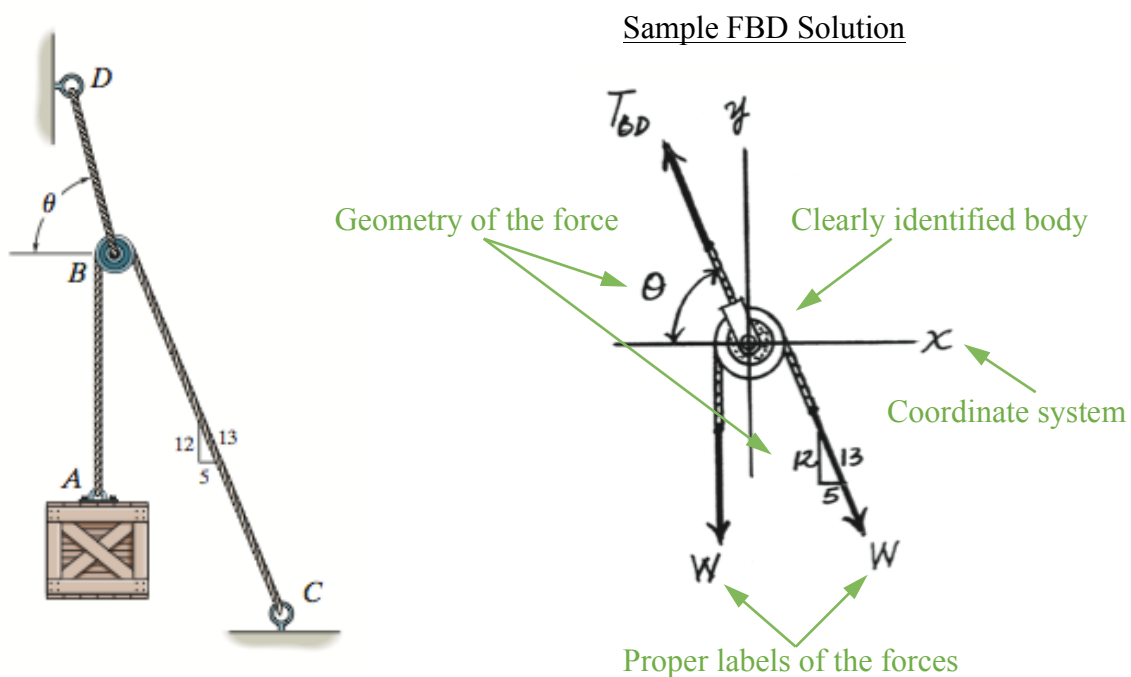
Sample EoE Solution

$$\sum F_x = 0 = -T_{BDx} + W_x = -T_{BD}(\cos\theta) + W\left(\frac{5}{13}\right) = 0$$

$$\sum F_y = 0 = T_{BDy} - W - W_y = T_{BD}(\sin\theta) - W - W\left(\frac{12}{13}\right) = 0$$

Problems 1: A crate with mass *m* is to be supported by the rope-and-pulley arrangement shown. Perform equilibrium analysis on the pulley system to determine the magnitude and direction of force *P* that must be exerted on the free end of the rope to maintain equilibrium. Assume the mass of the pulley is negligible.

0.75 m

B

2.4 m

P

α

A

200 kg
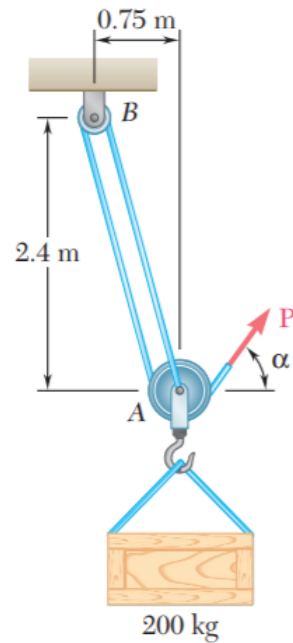
Problem 2: The weight of the cylinder is *W*. Perform equilibrium analysis on rings *A* and *B* to determine the tension in the cord AB.

D

5 : 3 : 4

C

B

60°

A

E

H
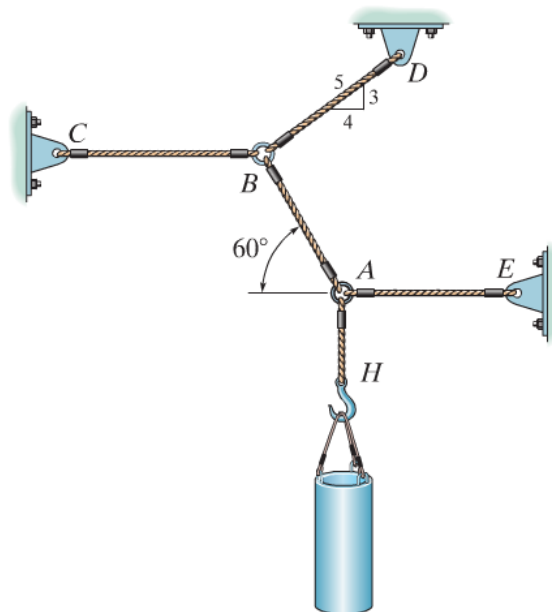
Problem 3: Given the mass of the crate is *m*, perform equilibrium analysis on point *A* to determine the tension developed in the cables *AC* and *AB*.
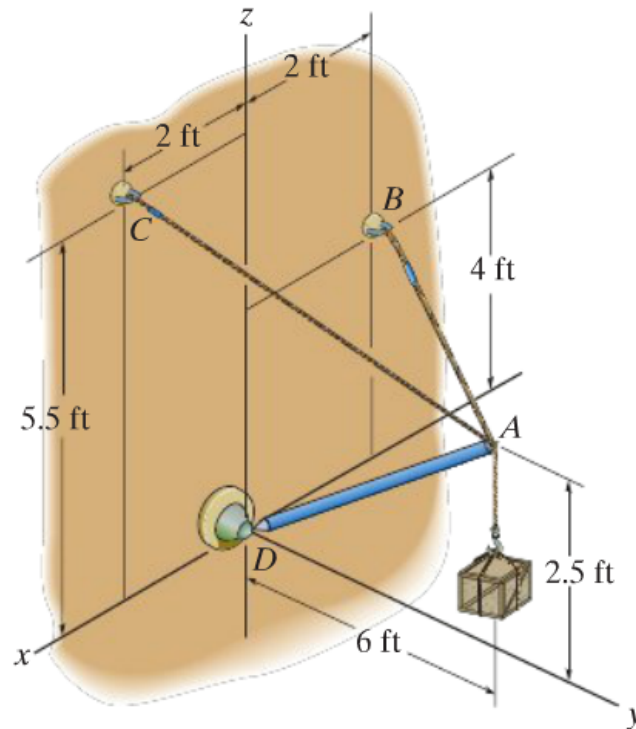
Problem 4: A triangular plate with weight *W* is supported by three cables as shown. Perform equilibrium analysis on the plate to determine the tension in each wire.