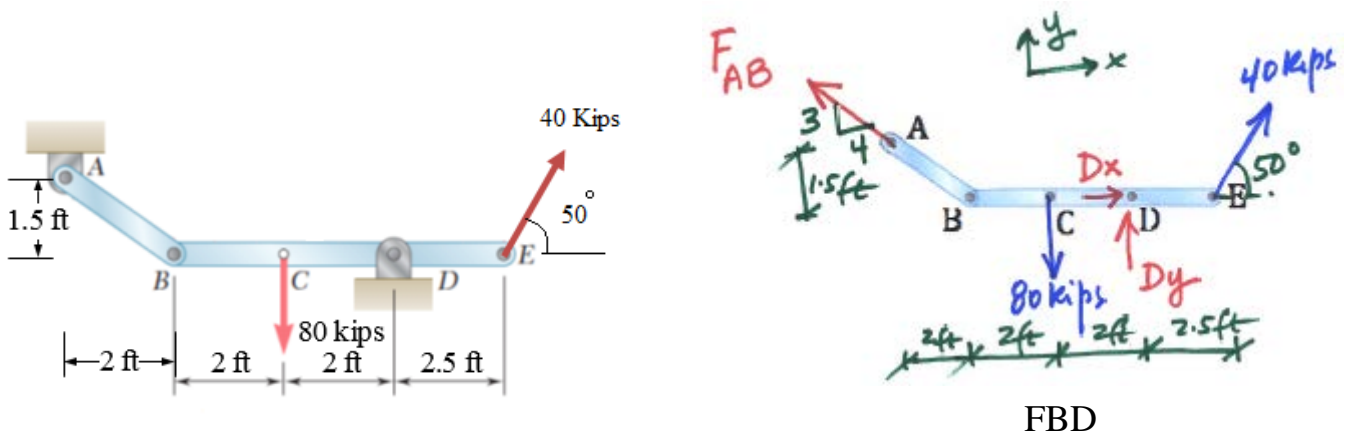


EGM 3420C - Engineering Mechanics

Statics Review 1 Problems

Problem 8

- a. For the system shown below, draw the complete free body diagram of ABCDE. Recognize that AB is a two-force member.



- b. Determine the reactions at supports A and D.

$$\sum M_D = 0 = F_{AB} \left(\frac{3}{5} \right) (4) - 80(2) - 40(\sin 50^\circ)(2.5)$$

$$0 = 2.4 F_{AB} - 236.6 \Rightarrow F_{AB} = 98.6 \text{ Kips}$$

$$\sum F_x = 0 = -F_{AB} \left(\frac{4}{5} \right) + D_x + 40 \cos 50^\circ \Rightarrow D_x = 53.2 \text{ Kips}$$

$$\sum F_y = 0 = F_{AB} \left(\frac{3}{5} \right) - 80 + D_y + 40 \sin 50^\circ \Rightarrow D_y = -9.80$$

$$D_y = 9.80 \text{ Kips}$$

Check

$$\sum M_E = F_{AB} \left(\frac{3}{5} \right) (6.5) - 80(4.5) + D_y(2.5)$$

$$= 384.54 - 360 - 24.5 = 384.54 - 384.5 \sim 0 \text{ O.K.}$$

ANSWER:

$$F_{AB} = 98.6 \text{ Kips} \nearrow A; D_x = 53.2 \text{ Kip} \rightarrow; D_y = 9.80 \text{ Kips} \downarrow$$