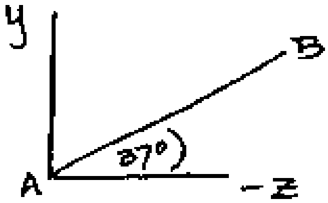
MECH 234 & 235

**PROB. 3.39**

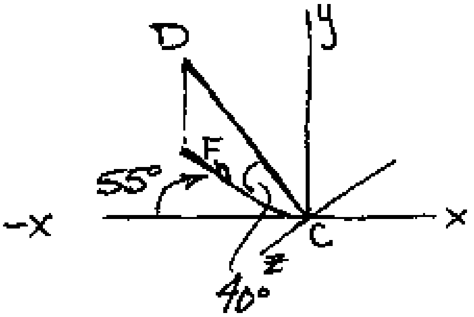
? ANGLE BETW. $\overline{AB}$ & $\overline{CD}$

$P.^{100}$

DOT PRODUCT



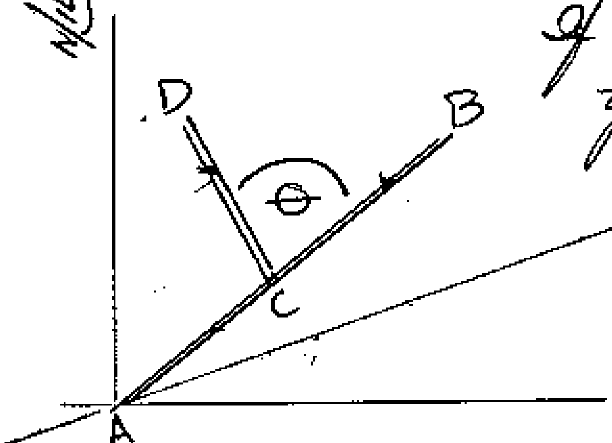

$$\overrightarrow{AB} = AB \sin 37° \hat{j} - AB \cos 37° \hat{k}$$
$$= .602\, AB \hat{j} - .799\, AB \hat{k}$$
$$\overrightarrow{AB} \approx .6\, AB \hat{j} - .8\, AB \hat{k}$$
$$= AB[.6 \hat{j} - .8 \hat{k}] \quad (1.)$$




$$CD_y = CD \sin 40° \hat{j} = .643\, CD \hat{j}$$
$$CD_{proj.h} = CD \cos 40° = .766\, CD$$
$$CD_x = -F_h \cos 55° = -(.766 CD) \cos 55°$$
$$= -0.439\, CD \hat{i}$$
$$CD_z = -F_h \sin 55° = -(.766 CD) \sin 55°$$
$$= -0.627\, CD \hat{k}$$

$$\overline{CD} = -.439\, CD \hat{i} + .643\, CD \hat{j} - .627\, CD \hat{k}$$
$$= CD[-.439 \hat{i} + .643 \hat{j} - .627 \hat{k}] \quad (2.)$$

N/LAND




If $\overline{CD}$ were projected onto $\overline{AB}$ you can use Dot Product to find $\theta$.

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where $\overrightarrow{AB} = AB\, \lambda_{AB}$ (1.)

$\overline{CD} = CD\, \lambda_{CD}$ (2.)

$$\cos\theta = \frac{(AB)(CD)\left[\overset{\hat{i}\cdot\hat{i}}{0} + \overset{\hat{j}\cdot\hat{j}}{(.6)(.643)} + \overset{\hat{k}\cdot\hat{k}}{(-.8)(-.627)}\right]}{(AB)(CD)}$$

$$\cos\theta = 0.887 \Rightarrow \boxed{\theta = 27.45°}$$