

Problem 2

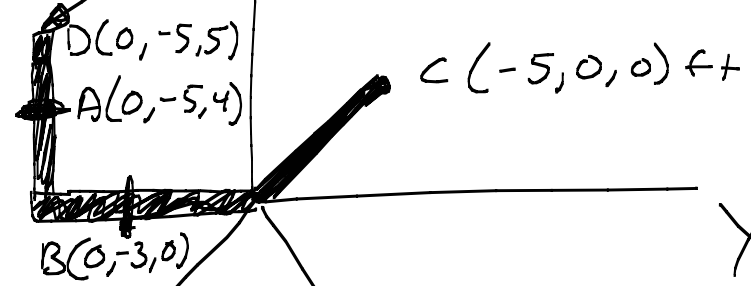
Given:

A \Rightarrow Restrained against translation in the x and y directions

B \Rightarrow Restrained against translation in the x and z directions

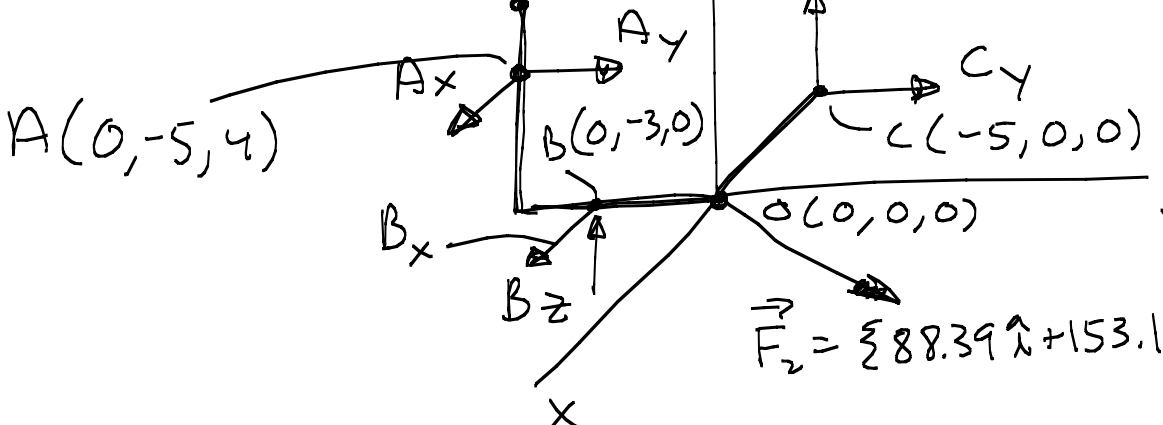
C \Rightarrow Restrained against translation in the y and z directions

$$\vec{F}_1 = \{-212.1\hat{i} - 212.1\hat{k}\} \text{ lb}$$



$$\vec{F}_2 = \{88.39\hat{i} + 153.1\hat{j} - 176.8\hat{k}\} \text{ lb}$$

$$\vec{F}_1 = \{-212.1\hat{i} - 212.1\hat{k}\} \text{ lb}$$



$$\vec{F}_2 = \{88.39\hat{i} + 153.1\hat{j} - 176.8\hat{k}\} \text{ lb}$$

$$\sum F_x = 0 \Rightarrow A_x + B_x + 88.39 \text{ lb} = 0$$

$$\sum F_y = 0 \Rightarrow A_y + C_y - 212.1 \text{ lb} + 153.1 \text{ lb} = 0$$

$$\sum F_z = 0 \Rightarrow B_z + C_z - 212.1 \text{ lb} - 176.8 \text{ lb} = 0$$

$$\sum \vec{M}_O = 0 \Rightarrow (\vec{r}_{OA} \times \vec{A}) + (\vec{r}_{OB} \times \vec{B}) + (\vec{r}_{OC} \times \vec{C}) + (\vec{r}_{OD} \times \vec{F}_1)$$

$$\vec{r}_{OA} \times \vec{A} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & -5 & 4 \\ A_x & A_y & 0 \end{vmatrix} = -4A_y \hat{i} + 4A_x \hat{j} + 5A_x \hat{k}$$

$$\vec{r}_{OB} \times \vec{B} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & -3 & 0 \\ B_x & 0 & B_z \end{vmatrix} = -3B_z \hat{i} + 0 \hat{j} + 3B_x \hat{k}$$

$$\vec{r}_{OC} \times \vec{C} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ -5 & 0 & 0 \\ 0 & C_y & C_z \end{vmatrix} = 0 \hat{i} + 5C_z \hat{j} - 5C_y \hat{k}$$

$$\vec{r}_{OD} \times \vec{F}_1 = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & -5 & 5 \\ 0 & -212.1 & -212.1 \end{vmatrix} = 2121 \hat{i}$$

$$(\Sigma M_o)_x = 0 \Rightarrow -4A_y - 3B_z + 2121 = 0$$

$$(\Sigma M_o)_y = 0 \Rightarrow 4A_x + 5C_z = 0$$

$$(\Sigma M_o)_z = 0 \Rightarrow 5A_x + 3B_x - 5C_y = 0$$

$$A_x = 633 \text{ lb}$$

$$A_y = -141 \text{ lb}$$

$$B_x = -721 \text{ lb}$$

$$B_z = 895 \text{ lb}$$

$$C_y = 200 \text{ lb}$$

$$C_z = -506 \text{ lb}$$