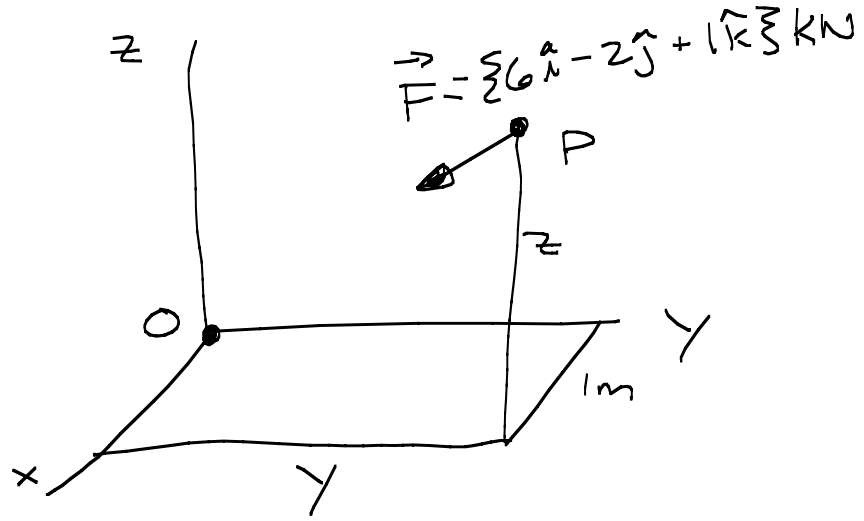
Problem 2

Determine: The y and z coordinates such that $\vec{F}$ produces a moment about point O of $\{4\hat{i} + 5\hat{j} - 14\hat{k}\}$ kN·m



$$\vec{M}_O = \vec{r}_{OP} \times \vec{F}$$

$$\vec{r}_{OP} = \{1\hat{i} + y\hat{j} + z\hat{k}\}\text{m}$$

$$\vec{F} = \{6i - 2\hat{j} + 1k\}\text{kN}$$

$$\vec{M}_O = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & y & z \\ 6 & -2 & 1 \end{vmatrix} = \{[(y)(1) - (z)(-2)]\hat{i} - [(1)(1) - (z)(6)]\hat{j} + [(1)(-2) - (y)(6)]\hat{k}$$

$$\vec{M}_O = \{(y + 2z)\hat{i} - (1 - 6z)\hat{j} + (-2 - 6y)\hat{k}\}$$

$\hat{i}$-comp $\quad y + 2z = 4$

$\hat{j}$-comp $\quad -(1 - 6z) = 5 \quad$ $z = 1\,m$

$\hat{k}$-comp $\quad -2 - 6y = -14 \quad$ $y = 2\,m$