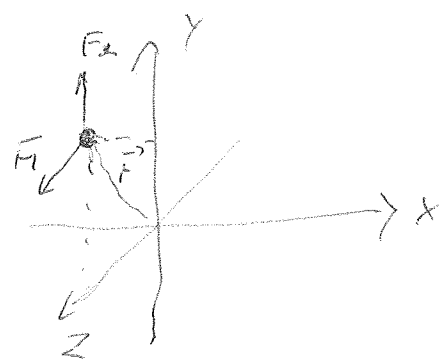


11-19) (coordinates of flea: $(0, -4.0\text{m}, 5.0\text{m})$)

$$\vec{F}_1 = (3.0\text{N})\hat{k} \quad \vec{F}_2 = (-2.0\text{N})\hat{j}$$

$$\vec{\tau} = \vec{r} \times \vec{F} \quad \vec{F} = \vec{F}_1 + \vec{F}_2$$

$$\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$$



Eqn. 3-30, cross-products in vector unit notation, vs.

$$\vec{\tau} = (yF_z - zF_y)\hat{i} + (zF_x - xF_z)\hat{j} + (xF_y - yF_x)\hat{k}$$

$$x=0, y=-4.0, z=5.0, \quad F_x=0, F_y=-2.0, F_z=3.0$$

Subst:

$$\begin{aligned} \vec{\tau} &= (-4 \cdot 3 - 5 \cdot (-2))\hat{i} + (5 \cdot 0 - 0 \cdot 3)\hat{j} + (0 \cdot (-2) - (-4) \cdot 0)\hat{k} \\ &= (-12 + 10)\hat{i} = (-2.0 \text{ N}\cdot\text{m})\hat{i} \end{aligned}$$

Cross-check: Cross product answers are always \perp to both inputs. All inputs are in y - z plane, so answer must be in x -direction (or $-x$).