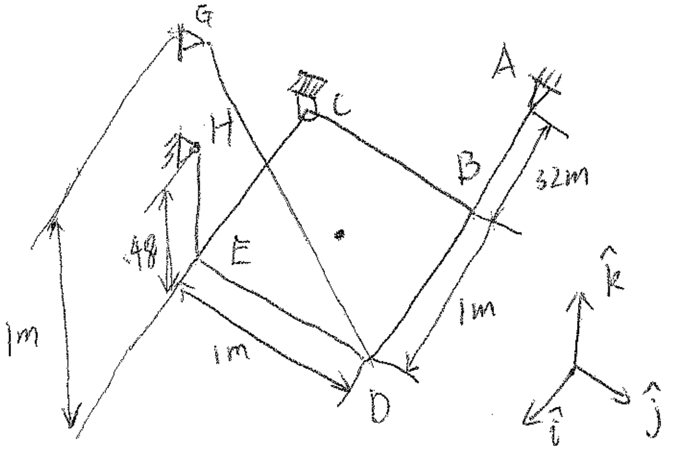
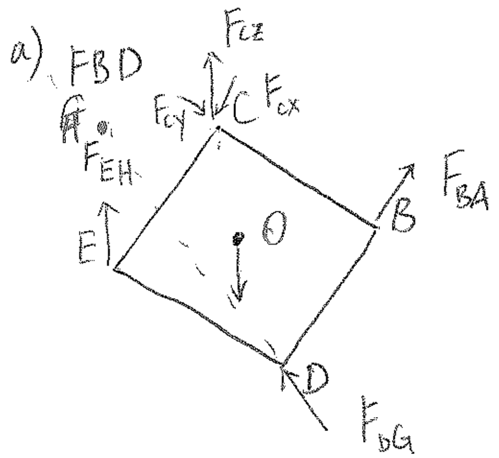
4.5.13



~~W=5kg~~
$m = 5kg$

a) FBD



b) F_{EH} would be zero since the $\Sigma M/_{CO} \neq 0$ if $F_{EH} \neq 0$

c) Equilibrium

$$\vec{F}_{DG} + \vec{F}_{CZ} + \vec{F}_{CX} + \vec{F}_{CY} + \vec{F}_{BA} = 0$$

d) $\Sigma \vec{M}_{/O} = 0$

$$\vec{r}_{OC} \times \vec{F}_{CZ} + \vec{r}_{OC} \times \vec{F}_{CX} + \vec{r}_{OC} \times \vec{F}_{CY} + \vec{r}_{OB} \times \vec{F}_{BA} + \vec{r}_{OD} \times \vec{F}_{DG} = 0$$

e) $\{\Sigma \vec{F} = \vec{0}\} \cdot \hat{i} \Rightarrow F_{BA} = -F_{CX}$

$\{\Sigma \vec{F} = \vec{0}\} \cdot \hat{j} \Rightarrow F_{CY} = -\frac{F_{DG}}{\sqrt{2}}$

$\{\Sigma \vec{F} = \vec{0}\} \cdot \hat{k} \Rightarrow F_{CZ} + \frac{F_{DG}}{\sqrt{2}} - mg = 0$

$\{\sum \vec{M}/_0 = \vec{0}\}\cdot\vec{i} \Rightarrow F_{cz}\frac{1}{2}\cancel{DE} = \frac{F_{DG}}{\sqrt{2}}\frac{1}{2}\cancel{DE}$

$\{\sum \vec{M}/_0 = \vec{0}\}\cdot\vec{j} \Rightarrow F_{cz}\frac{1}{2}\cancel{CE} = \frac{F_{DG}}{\sqrt{2}}\frac{1}{2}\cancel{DE}$

$\{\sum \vec{M}/_0 = \vec{0}\}\cdot\vec{k} \Rightarrow -\frac{F_{DG}}{\sqrt{2}}\cdot\frac{1}{2}\overline{DB} + F_{BE}\cdot\frac{1}{2}\overline{BC} + F_{cx}\frac{1}{2}\overline{BC} - F_{cy}\frac{1}{2}\overline{EC} = 0$

f) $\vec{F}_{DG} = -24.5N\,\hat{j} + 24.5N\,\hat{k}$

$\vec{F}_{cz} = 24.5\,N\,\hat{k}$

$\vec{F}_{cy} = 24.5N\,\vec{j}$

$\vec{F}_{cx} = 24.5N\,\hat{i}$

$\vec{F}_{BA} = -24.5N\,\hat{i}$

g) see b) to see how to find F_{EH} without solving equations

h) 1) Moment respect to axis $\overline{CE}$

$$\frac{F_{DG}}{\sqrt{2}}\cdot\overline{DE} = -mg\frac{1}{2}\overline{DE} \Rightarrow F_{DG} = \frac{-\sqrt{2}}{2}mg = 34.64N$$

2) Moment respect to $\overline{CG}$ direction

$$F_{BA}\cdot\cancel{\overline{\Xi}} = \cancel{+}\frac{1}{2}mg = 24.5\,N$$

3) Moment respect $\overline{BD}$

$$F_{cz} = \frac{1}{2}mg = 24.5N$$