Problem 2 – Method of Sections and Zero Force Members in Trusses
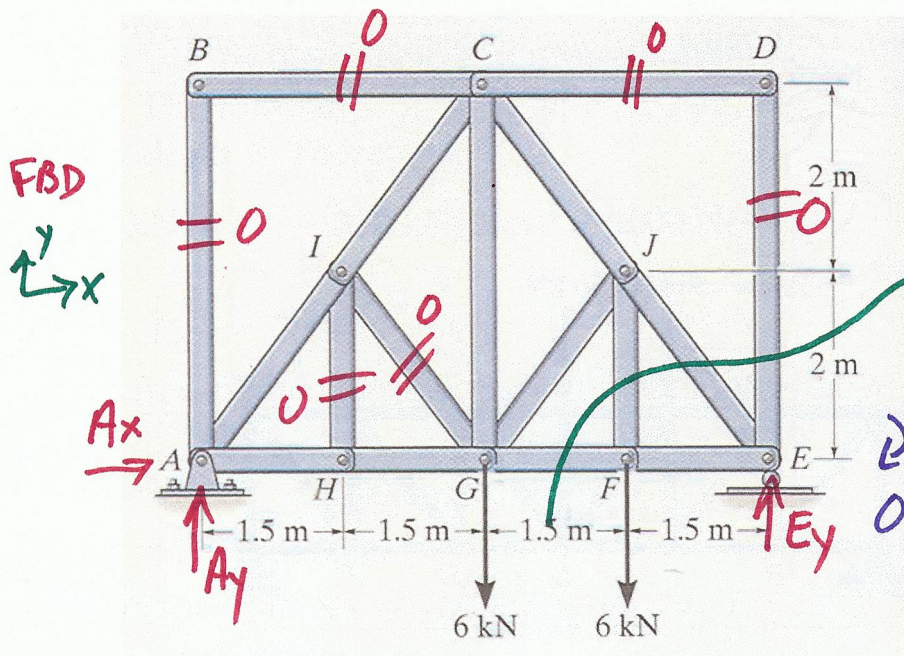
Identify all zero force members. Determine the forces in members JE, GF and JF.

FBD

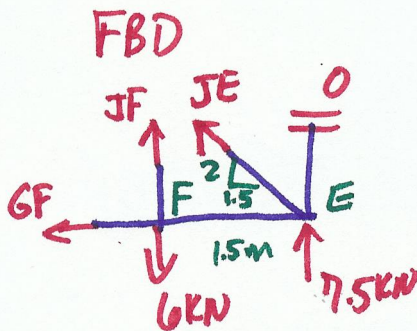B — C — D ($=0$ members BC, CD)

$=0$

$=0$

$0=\parallel$

A_x

A H G F E

$\leftarrow 1.5\,m \rightarrow\leftarrow 1.5\,m \rightarrow\leftarrow 1.5\,m \rightarrow\leftarrow 1.5\,m \rightarrow$

A_y

$6\,kN$ $6\,kN$

2 m

2 m

NONCONCURRENT
3 EQNS
3 UNKS ☺

SECTION CUT

EXTERNAL

$$\circlearrowleft \Sigma M_A = 0$$
$$0 = 3m\,(6kN) + 4.5m\,(6kN) - 6m\,E_y$$
$$E_y = 7.5\,kN \uparrow$$

FBD

$JF \quad JE \quad =0$

$GF \leftarrow$ $F \; 2 \rfloor_{1.5}$ E

$1.5\,m$

$6kN$ $7.5kN$

NON CONCURRENT
3 EQNS ☺
3 UNKS

$$\circlearrowleft \Sigma M_J = 0$$
$$-1.5m\,(7.5kN) + 2m\,GF = 0$$
$$GF = 5.62 \quad kN\,(T)$$

$$\rightarrow \Sigma F_x = 0$$
$$-GF - \frac{1.5}{2.5}\,JE$$
$$JE = \boxed{-9.375} = 9.38\,kN\,(C)$$

$$\uparrow \Sigma F_y = 0$$
$$JF - 6kN + \frac{2}{2.5}\,JE + 7.5$$
$$JF = 6\,kN\,(T)$$