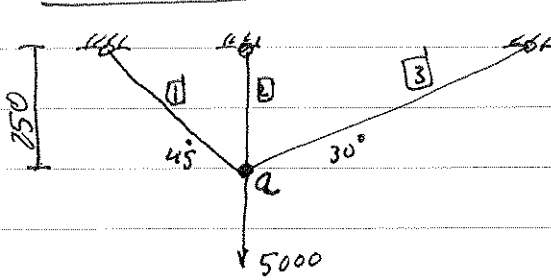


Problem I:

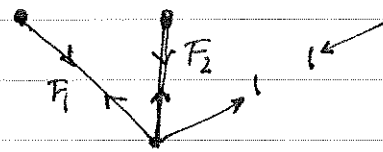
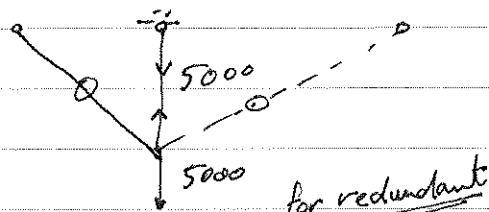
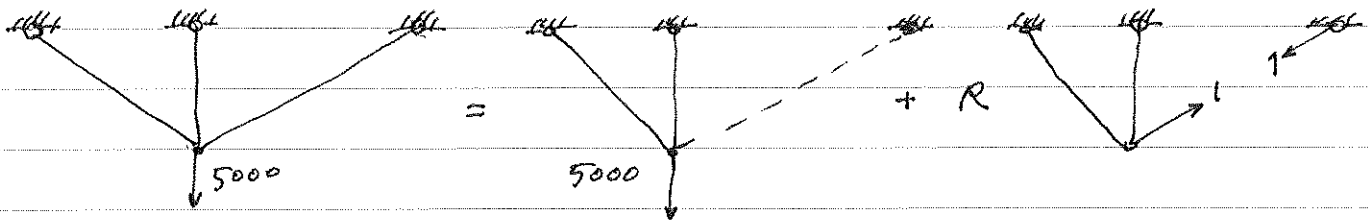


$$A_1 = A_2 = 0.5, \quad A_3 = 1$$

$$E = 200 \times 10^5$$

Find the vertical displacement of point 'a'

To find displacements we need the internal forces in all members. This truss is statically indeterminate (why?) and has a single redundant member. We use the unit load method.



for displacement

$$-F_1 \cos 45 + 1 \cos 30 = 0 \Rightarrow F_1 = 1.225$$

$$F_2 + F_1 \sin 45 + 1 \sin 30 = 0 \Rightarrow F_2 = -1.366$$

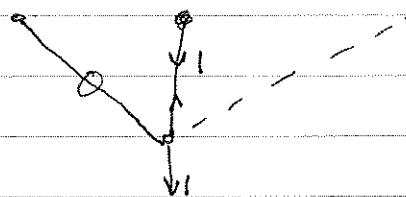
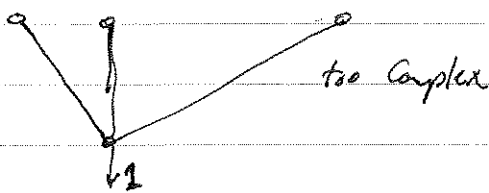
for redundant

F	(A)	L	A	E	$\frac{F L}{EA}$	$\frac{f^2 L}{EA}$	$F_{total}$	(B)
1	0	1.225	353.6	0.5	$2 \times 10^7$	0	$5.303 \times 10^{-3}$	0
2	5000	-1.366	250	0.5	$2 \times 10^7$	-0.1708	$4.665 \times 10^5$	1
3	0	1	500	1	$2 \times 10^7$	0	$2.500 \times 10^5$	0

$$\Sigma \quad \quad \quad -0.1708 \quad 1.247 \times 10^{-4}$$

$$-0.1708 + 1.247 \times 10^{-4} R = 0$$

$$R = 1369.5$$



$$\Sigma \frac{F L}{EA} = \frac{3129.2 \times 250}{2 \times 10^7 \times 0.5} = \boxed{0.0782}$$