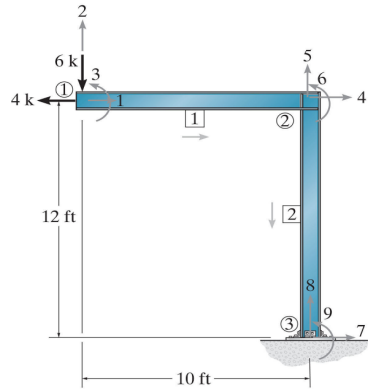
Problem 16a-1



Element 1

L =	120	in	E =	29,000	ksi
I =	650	in^4	θ_x =	0	°
A =	20	in^2	θ_y =	90	°

λ_x =	1.000
λ_y =	0.000

AE/L =	4,833.3	k/in
$12EI/L^3$ =	130.9	k/in
$6EI/L^2$ =	7,854.2	k
4EI/L =	628,333.3	k in
2EI/L =	314,166.7	k in

1	2	3	4	5	6	
4,833.33	0.00	0.00	-4,833.33	0.00	0.00	1
0.00	130.90	7,854.17	0.00	-130.90	7,854.17	2
0.00	7,854.17	628,333.33	0.00	-7,854.17	314,166.67	3
-4,833.33	0.00	0.00	4,833.33	0.00	0.00	4
0.00	-130.90	-7,854.17	0.00	130.90	-7,854.17	5
0.00	7,854.17	314,166.67	0.00	-7,854.17	628,333.33	6

Element 2

L =	144	in	E =	29,000	ksi
I =	650	in^4	θ_x =	90	°
A =	20	in^2	θ_y =	180	°

λ_x =	0.000
λ_y =	-1.000

AE/L =	4,027.8	k/in
$12EI/L^3$ =	75.8	k/in
$6EI/L^2$ =	5,454.3	k
4EI/L =	523,611.1	16a-1
2EI/L =	261,805.6	k in

4	5	6	7	8	9	
75.75	0.00	5,454.28	-75.75	0.00	5,454.28	4
0.00	4,027.78	0.00	0.00	-4,027.78	0.00	5
5,454.28	0.00	523,611.11	-5,454.28	0.00	261,805.56	6
-75.75	0.00	-5,454.28	75.75	0.00	-5,454.28	7
0.00	-4,027.78	0.00	0.00	4,027.78	0.00	8
5,454.28	0.00	261,805.56	-5,454.28	0.00	523,611.11	9

k1

1	2	3	4	5	6	7	8	9	
4,833.33	0.00	0.00	-4,833.33	0.00	0.00				1
0.00	130.90	7,854.17	0.00	-130.90	7,854.17				2
0.00	7,854.17	628,333.33	0.00	-7,854.17	314,166.67				3
-4,833.33	0.00	0.00	4,833.33	0.00	0.00				4
0.00	-130.90	-7,854.17	0.00	130.90	-7,854.17				5
0.00	7,854.17	314,166.67	0.00	-7,854.17	628,333.33				6
									7
									8
									9

k2

1	2	3	4	5	6	7	8	9	
									1
									2
									3
			75.75	0.00	5,454.28	-75.75	0.00	5,454.28	4
			0.00	4,027.78	0.00	0.00	-4,027.78	0.00	5
			5,454.28	0.00	523,611.11	-5,454.28	0.00	261,805.56	6
			-75.75	0.00	-5,454.28	75.75	0.00	-5,454.28	7
			0.00	-4,027.78	0.00	0.00	4,027.78	0.00	8
			5,454.28	0.00	261,805.56	-5,454.28	0.00	523,611.11	9

K

1	2	3	4	5	6	7	8	9	
4833.33	0.00	0.00	-4833.33	0.00	0.00	0.00	0.00	0.00	1
0.00	130.90	7854.17	0.00	-130.90	7854.17	0.00	0.00	0.00	2
0.00	7854.17	628333.33	0.00	-7854.17	314166.67	0.00	0.00	0.00	3
-4833.33	0.00	0.00	4909.09	0.00	5454.28	-75.75	0.00	5454.28	4
0.00	-130.90	-7854.17	0.00	4158.68	-7854.17	0.00	-4027.78	0.00	5
0.00	7854.17	314166.67	5454.28	-7854.17	1151944.44	-5454.28	0.00	261805.56	6
0.00	0.00	0.00	-75.75	0.00	-5454.28	75.75	0.00	-5454.28	7
0.00	0.00	0.00	0.00	-4027.78	0.00	0.00	4027.78	0.00	8
0.00	0.00	0.00	5454.28	0.00	261805.56	-5454.28	0.00	523611.11	9

K

1	2	3	4	5	6	
4833.33	0.00	0.00	-4833.33	0.00	0.00	1
0.00	130.90	7854.17	0.00	-130.90	7854.17	2
0.00	7854.17	628333.33	0.00	-7854.17	314166.67	3
-4833.33	0.00	0.00	4909.09	0.00	5454.28	4
0.00	-130.90	-7854.17	0.00	4158.68	-7854.17	5
0.00	7854.17	314166.67	5454.28	-7854.17	1151944.44	6

Q	
-4	1
-6	2
0	3
0	4
0	5
0	6

$D = K^{-1}Q$	
-0.60806	in.
-1.10888	in.
0.00999	radians
-0.60723	in.
-0.00149	in.
0.00770	radians

	1	2	3	4	5	6	7	8	9		D		Q	
	4833.33	0.00	0.00	-4833.33	0.00	0.00	0.00	0.00	0.00	1	-0.60806		-4.00	
	0.00	130.90	7854.17	0.00	-130.90	7854.17	0.00	0.00	0.00	2	-1.10888		-6.00	
K	0.00	7854.17	628333.33	0.00	-7854.17	314166.67	0.00	0.00	0.00	3	0.00999		0.00	
	-4833.33	0.00	0.00	4909.09	0.00	5454.28	-75.75	0.00	5454.28	4	-0.60723	=	0.00	
	0.00	-130.90	-7854.17	0.00	4158.68	-7854.17	0.00	-4027.78	0.00	5	-0.00149		0.00	
	0.00	7854.17	314166.67	5454.28	-7854.17	1151944.44	-5454.28	0.00	261805.56	6	0.00770		0.00	
	0.00	0.00	0.00	-75.75	0.00	-5454.28	75.75	0.00	-5454.28	7	0.00000		4.00	k
	0.00	0.00	0.00	0.00	-4027.78	0.00	0.00	4027.78	0.00	8	0.00000		6.00	k
	0.00	0.00	0.00	5454.28	0.00	261805.56	-5454.28	0.00	523611.11	9	0.00000		-1296.00	k-in