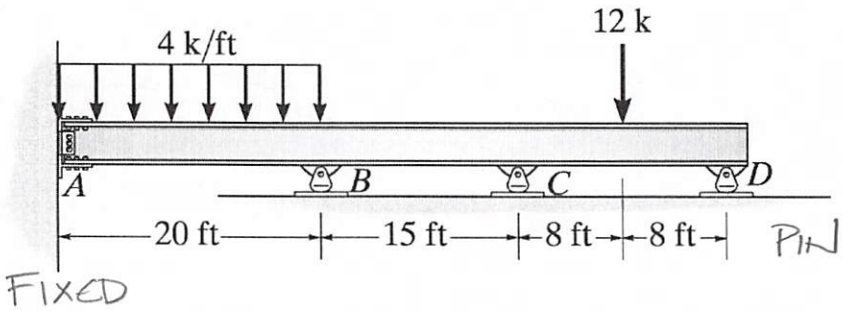
Problem 11a-4 – Determine the moments at each support. Assume *A* is fixed. *EI* is constant.

1/2



$$FEM_{AB} = \frac{WL^2}{12} = \frac{4k/ft(20ft)^2}{12} = \pm 133.33\,kft$$

$$FEM_{CD} = \frac{3PL}{16} = \frac{3(12k)(16ft)}{16} = -36\,kft$$

$DF_{AB} = 0$ $DF_{DC} = 1$

$$K_{BA} = \frac{4EI}{L_{AB}} = \frac{4EI}{20'} \qquad K_{BC} = \frac{4EI}{L_{BC}} = \frac{4EI}{15'}$$

JOINT B

$$DF_{BA} = \frac{K_{BA}}{K_{BA}+K_{BC}} = \frac{4/20}{4/20+4/15} = 0.429$$

$$\Sigma DF_B = 1 \checkmark$$

$$DF_{BC} = \frac{K_{BC}}{K_{BA}+K_{BC}} = \frac{4/15}{4/20+4/15} = 0.571$$

$$K_{CB} = \frac{4EI}{L_{BC}} = \frac{4EI}{15'} \qquad K_{CD} = \frac{3EI}{L_{CD}} = \frac{3EI}{16'}$$

JOINT C

$$DF_{CB} = \frac{K_{CB}}{K_{CB}+K_{CD}} = \frac{4/15}{4/15+3/16} = 0.587$$

$$\Sigma DF_C = 1 \checkmark$$

$$DF_{CD} = \frac{K_{CD}}{K_{CD}+K_{CD}} = \frac{3/16}{4/15+3/16} = 0.413$$

JOINT	A	B		C		D
MEMBERS	AB	BA	BC	CB	CD	DC
DF	0	0.429	0.571	0.587	0.413	1
FEM	-133.33	133.33			-36	
DIST.		-57.199	-76.131	21.132	14.868	
CO	-28.066		10.566	-38.066		
DIST.		-4.533	-6.033	22.345	15.721	
CO	-2.267		11.173	-3.017		
DIST		-4.793	-6.380	1.771	1.246	
CO	-2.397		0.886	-3.190		
DIST		-0.380	-0.506	1.873	1.317	
CO	-0.190		0.937	-0.253		
DIST		-0.402	-0.535	0.149	0.104	
$\sum$	-166.78					0