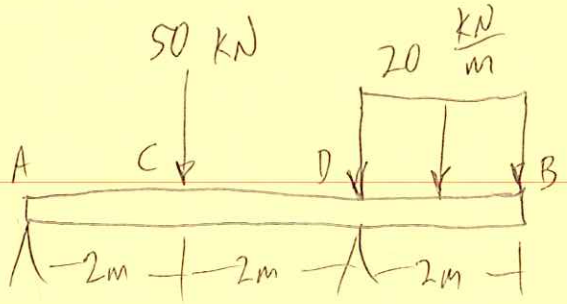
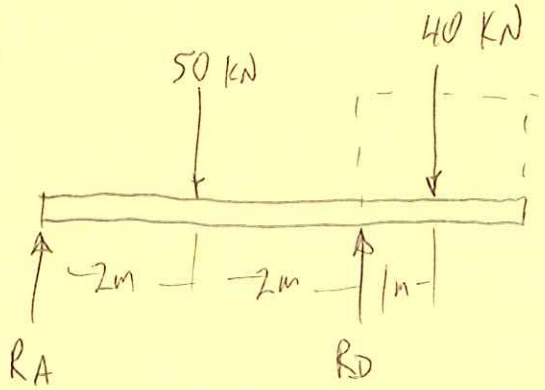
PROB. 7.40

DRAW SHEAR & BENDING MOMENT DIAGRAMS, DETERMINE MAXIMUMS.



FBD:

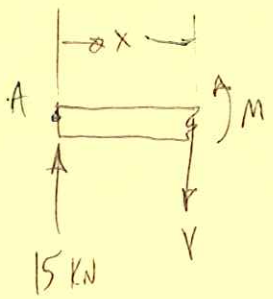


$\Sigma M_A = 0$: $+\circlearrowleft \quad -(2m)(50\,kN) + (4m)R_D - (5m)(40\,kN) = 0$

$R_D = 75\,kN$

$\Sigma F_y = 0$: $\quad R_A - 50 + 75 - 40 = 0 \qquad R_A = 15\,kN$

FBD FROM A TO C:

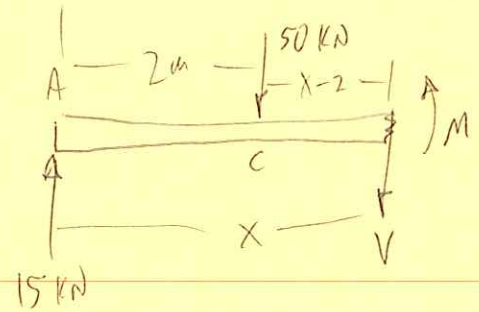


$V = 15\,kN$

$M = 15x \quad kN\text{-}m$

PROB. 7.40

FBD FROM C TO D:

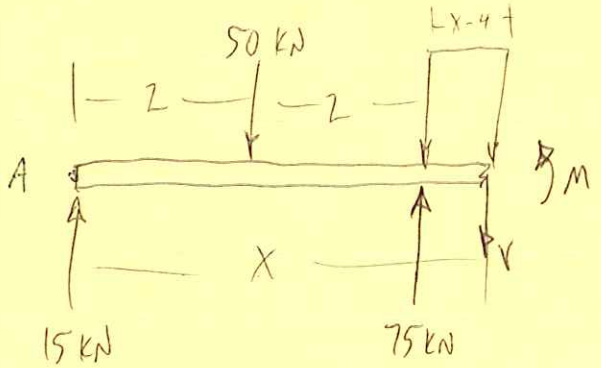


$\Sigma F_y = 0$: $15 - 50 - V = 0$ $\quad V = -35$ kN

$\Sigma M = 0$: $M + (x-2)(50) - (x)(15) = 0$

$M = -35x + 100$

FBD FROM D TO B:



$\Sigma F_y = 0$: $15 - 50 + 75 - (20)(x-4) - V = 0$

$V = -20x + 120$ kN

$\Sigma M = 0 +\circlearrowleft$: $M + \frac{1}{2}(x-4)(20)(x-4) - 75(x-4) + 50(x-4+2) - 15x = 0$

$M = -10x^2 + 120x - 360$

PROB. 7.40

$X = 0^+ : \quad V = 15, \quad M = 0$

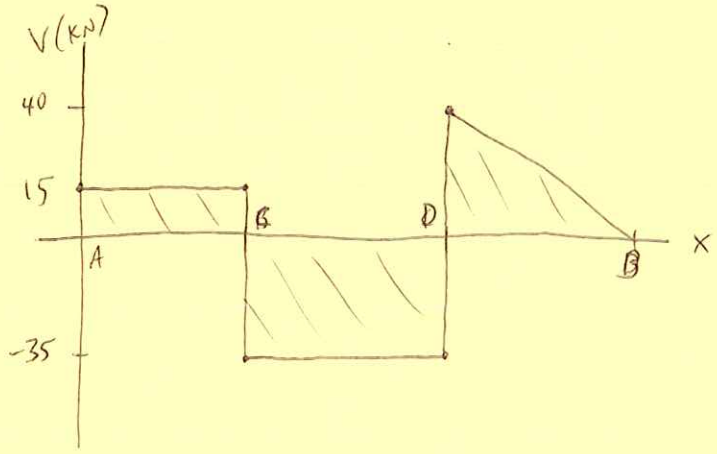
$X = 2^- : \quad V = 15, \quad M = 30$

$X = 2^+ : \quad V = -35, \quad M = 30$

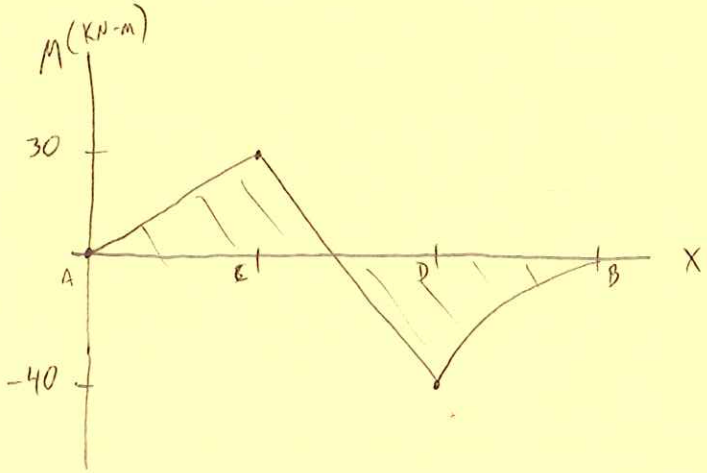
$X = 4^- : \quad V = -35, \quad M = -40$

$X = 4^+ : \quad V = 40, \quad M = -40$

$X = 6^- : \quad V = 0, \quad M = 0$



$V_{max} = 40 \text{ KN}$



$M_{MAX} = 40 \text{ KN-M}$