HW. 1

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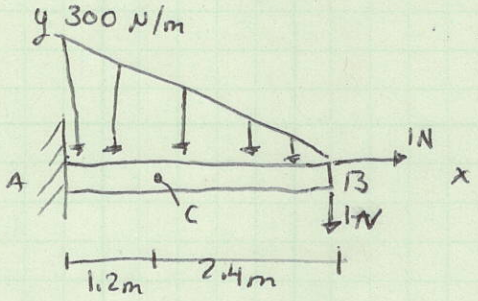
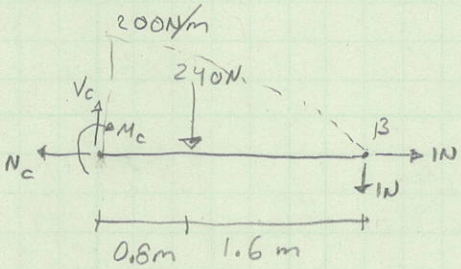
CET 220 FALL 2023

51/60

1. Determine the resultant internal ~~loo~~ loadings acting on the ~~cross triangular loading~~ cross section at C of the cantilevered beam.





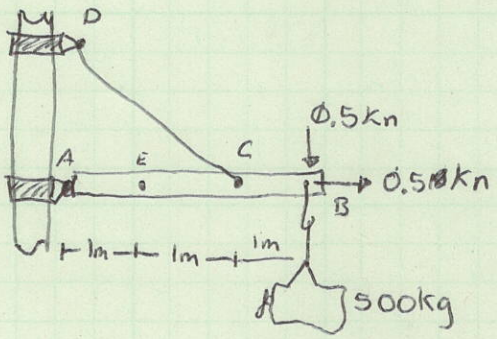
-6

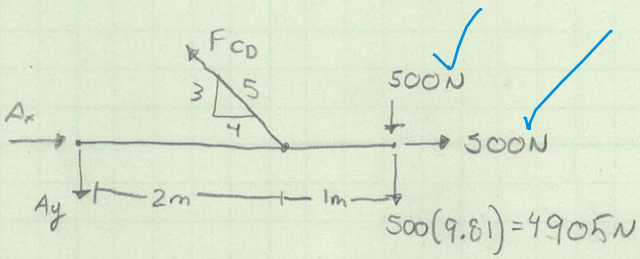
$\rightarrow \Sigma F_x = 0$
$-N_C + 1N = 0$
$N_C = -1N$
$N_C = -1.00\ N$

$\rightarrow \Sigma F_y = 0$
$V_C - 240 - 1N = 0$
$V_C = 241\ N$

$\Sigma M_C = 0$
$-M_C - 240(0.8) - 1(2.4) = 0$
$M_C = \ominus 194.4\ N$
$\ominus 194\ Nm$ X

2. The 500 kg engine is suspended from the crane boom. Determine the resultant internal loadings acting on the cross section of the boom at E.

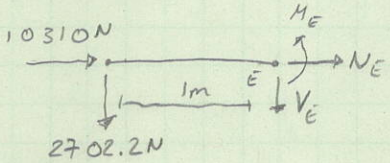




$\Sigma M_A = 0$
$F_{CD}\left(\frac{3}{5}\right)(2) - 4905(3) - 500(3) = 0$
$F_{CD} = 13\,512.5\ N$

$\Sigma F_x = 0$
$A_x - (13\,512.5)\left(\frac{4}{5}\right) + 500 = 0$
$A_x = 10\,310\ N$

$\Sigma F_y = 0$
$-A_y + 13512.5\left(\frac{3}{5}\right) - 4905 - 500 = 0$
$A_y = 2702.2\ N$

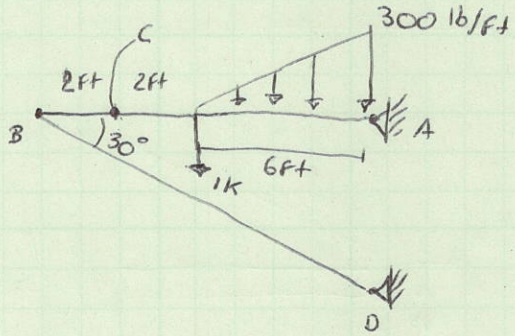


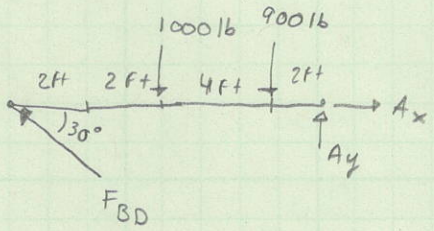
$\Sigma F_x = 0$
$N_E + 10310 = 0$
$N_E = -10310\ N$
$N_E = -10.3\ kn$

$\Sigma F_y = 0$
$-2702.2 - V_E = 0$
$V_E = -2702.2$
$V_E = -2.70\ kn$

$\Sigma M_E = 0$
$2702.2(1) + M_E = 0$
$M_E = -2702.2\ Nm$
$M_E = -2.70\ Kn{\cdot}m$

3. Determine the resultant internal loadings acting on the cross section at C of the beam.



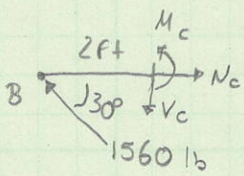


$\Sigma M_A = \emptyset$

$900(2) + 1000(6) - F_{BD}(\sin 30°)(10) = \emptyset$

$F_{BD} = \frac{-7800}{-5}$

$F_{BD} = 1560$ lb



$\Sigma F_x = \emptyset$

$N_c - 1560(\cos 30°) = \emptyset$

$N_c = 1351$ lb

1350 lb

$\Sigma F_y = \emptyset$

$-V_c + (1350)(\sin 30) = \emptyset$

$V_c = 675$ lb

$\Sigma M_c = \emptyset$

$M_c - 1350(\sin 30)(2) = \emptyset$

$M_c = 1350$ lb·ft