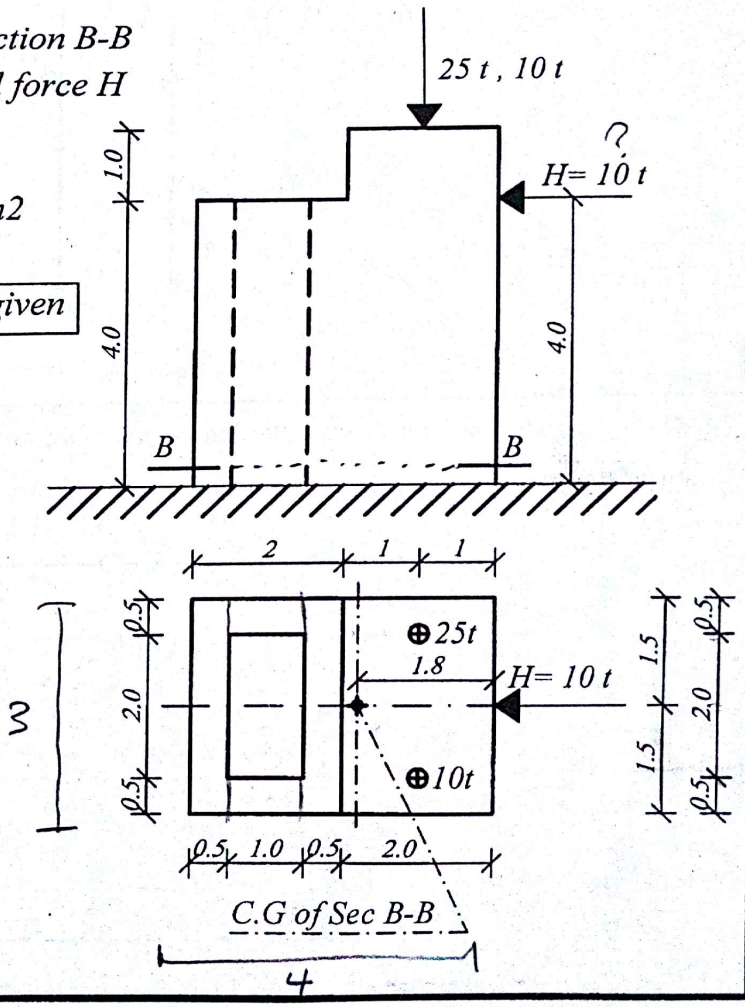
Q6) The shown block has specific gravity = 2.5 t / m3

1- Draw the normal stress distribution at section B-B

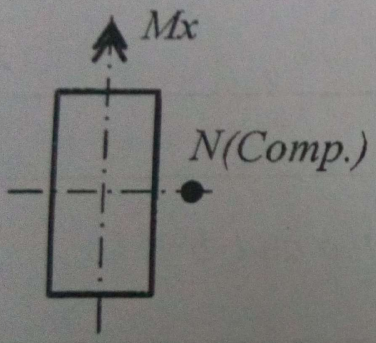
2- Find the maximum value of the horizontal force H such that no tension stress occurs at section B-B and the maximum compression stress does not exceed 40 t/m2

Center of Gravity (C.G) of Sec B-B is given

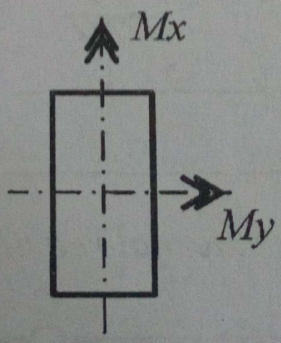
(30 marks)



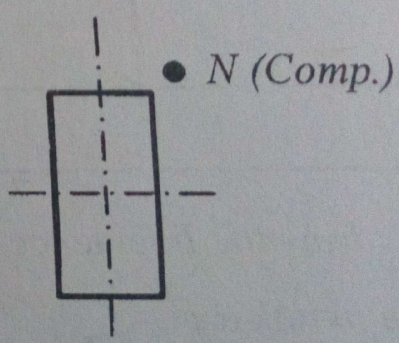
) For the shown sections, scketch the normal stress distributions for the th



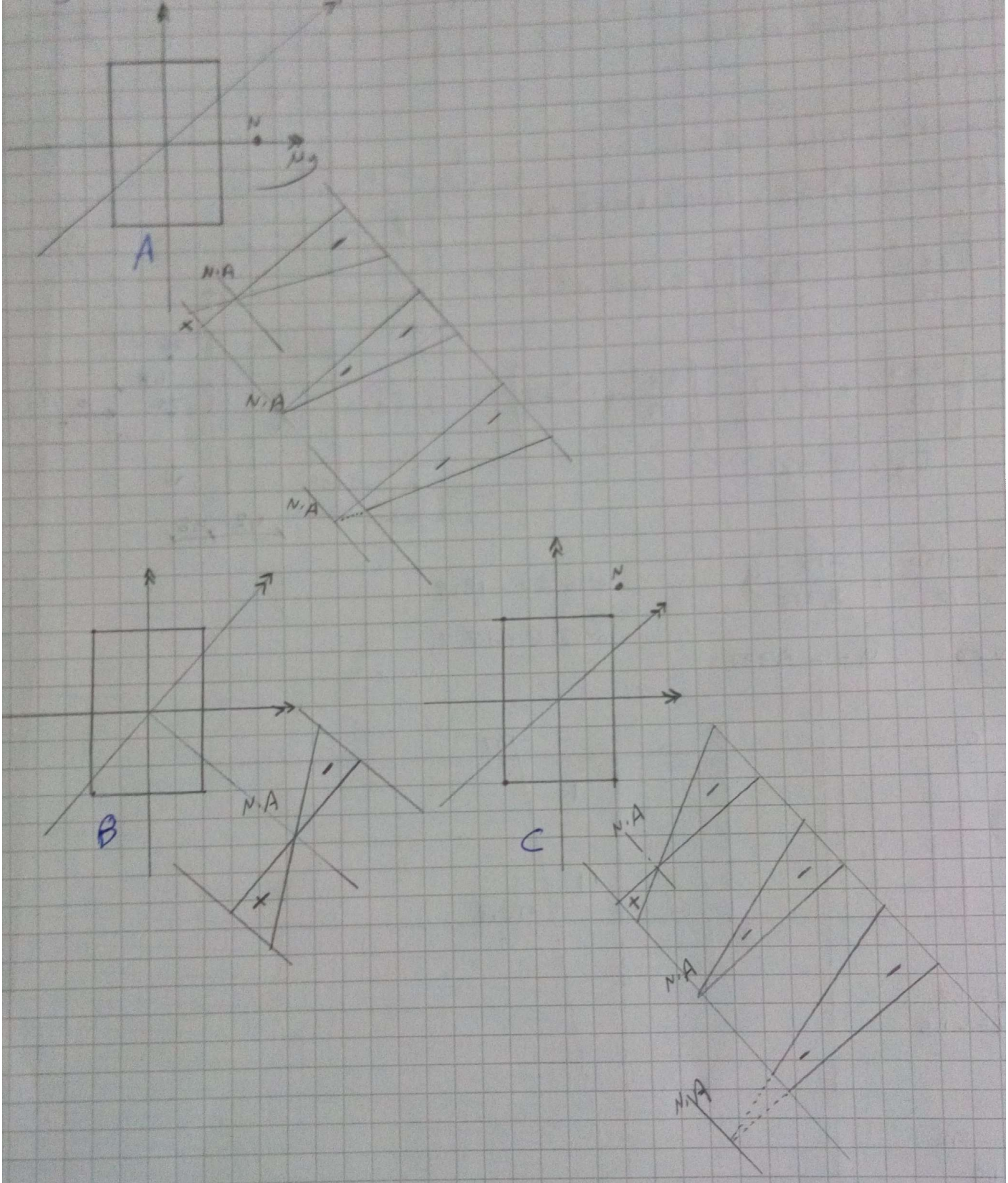
Case A



Case B



Case C


N
Ug
A
N.A
N.A
N.A
B
N.A
N
C
N.A
N.A
N.A

Q6)

$W_1 = 6 * 5 * 2,5 = 75$ ton $A = 10\ m^2$

$W_2 = 4 * 4 * 2,5 = 40$ ton

$N = -150$

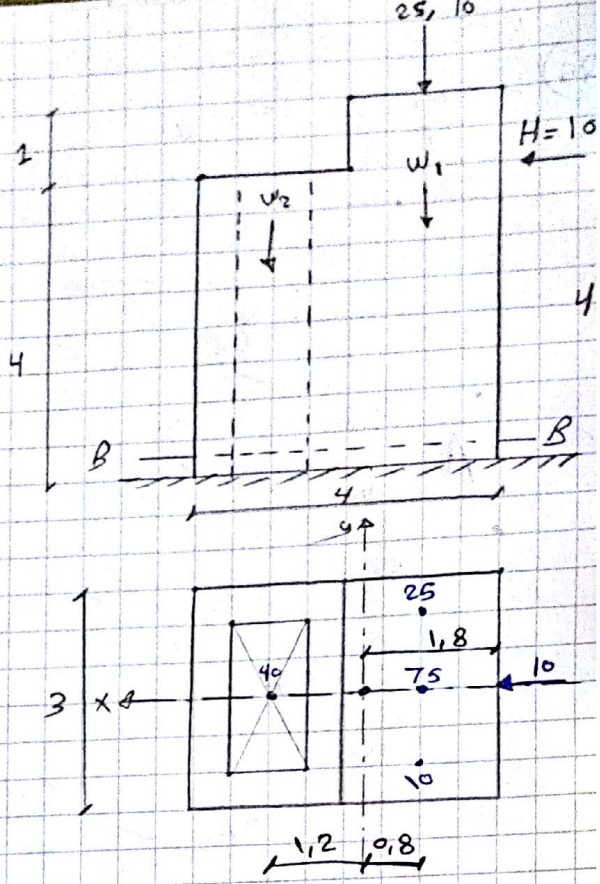
$M_x = -25 * 2 + 10 * 1 = -15$ t·m

$M_y = (-25 - 75 - 10) * 0,8 + 40 * 1,2 + 10 * 4 = 0$

$$I_x = \left[\frac{4 * 3^3}{12} - \frac{1 * 2^3}{12}\right] = 8,333\ m^4$$

$$I_y = \left[\frac{3 * 4^3}{12} + 0,2^2 * 12\right] - \left[\frac{2 * 1^3}{12} + 1,2^2 * 2\right]$$

$I_y = 13,433$

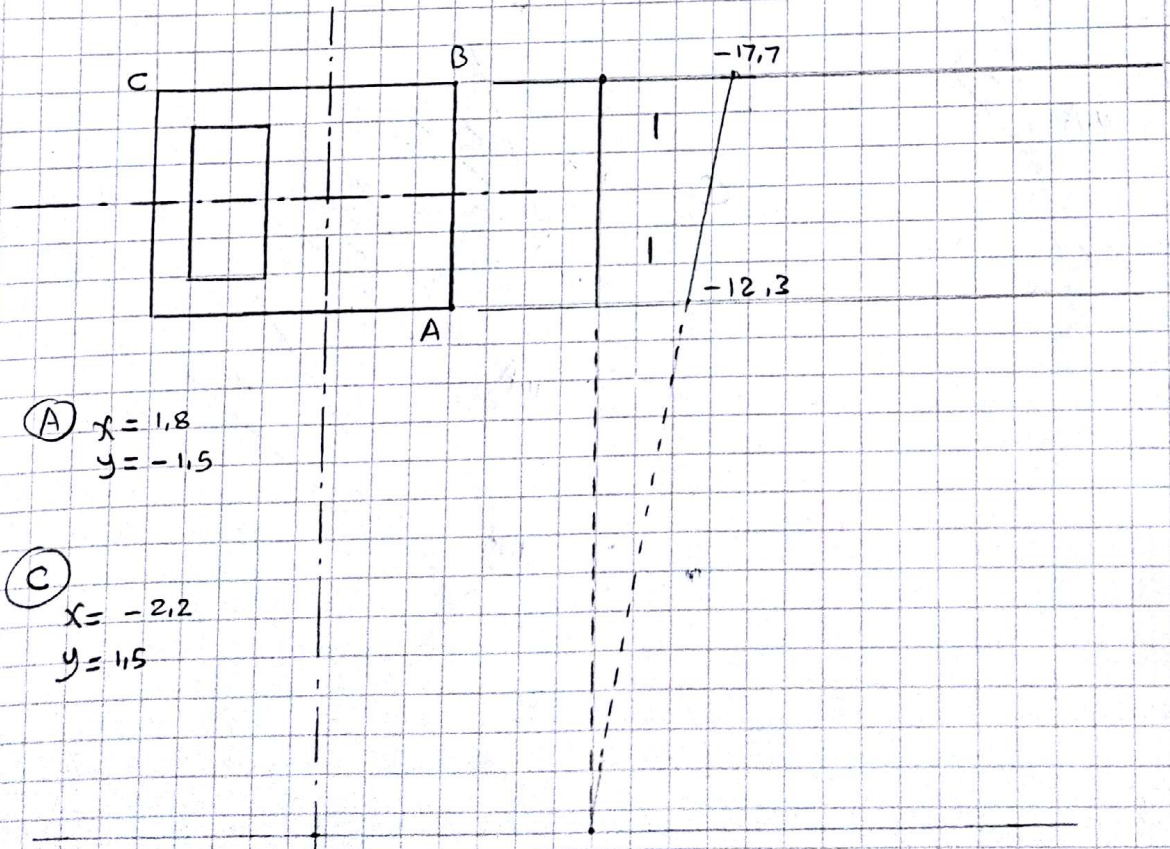


$$\sigma = \frac{-150}{10} + \frac{-15}{8,333} y$$

σ @ A = −12,3

σ @ B = −17,7

@ $\sigma = 0$ $y = -8,333$



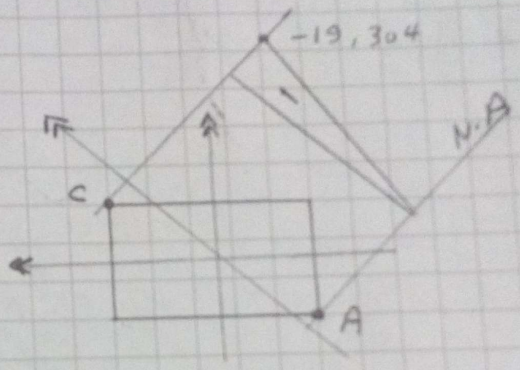
(A) $x = 1,8$
$y = -1,5$

(C) $x = -2,2$
$y = 1,5$

$N = -150$ ، $M_x = -15\ t.m$ ، $I_x = 8,333$ ، $I_y = 13,433$

$M_y = (-40 + 4H)\ t.m$

$$\sigma = -15 + \frac{-15}{8,333}y + \frac{(4H - 40)}{13,433}x$$



@ A $\sigma = 0$

$$-15 + \frac{-15 * -1,5}{8,333} + \frac{4(H-10) * 1,8}{13,433} = 0$$

$H = 12,448\ ton$ مقبول

@ C $\sigma = -40\ t/m^2$

$$-15 + \frac{-15 * 1,5}{8,333} + \frac{4 * -2,2\ (H-10)}{13,433} = -40$$

$H = 44,04\ ton$ مرفوض

لأنه لا يحقق الشرط الأول