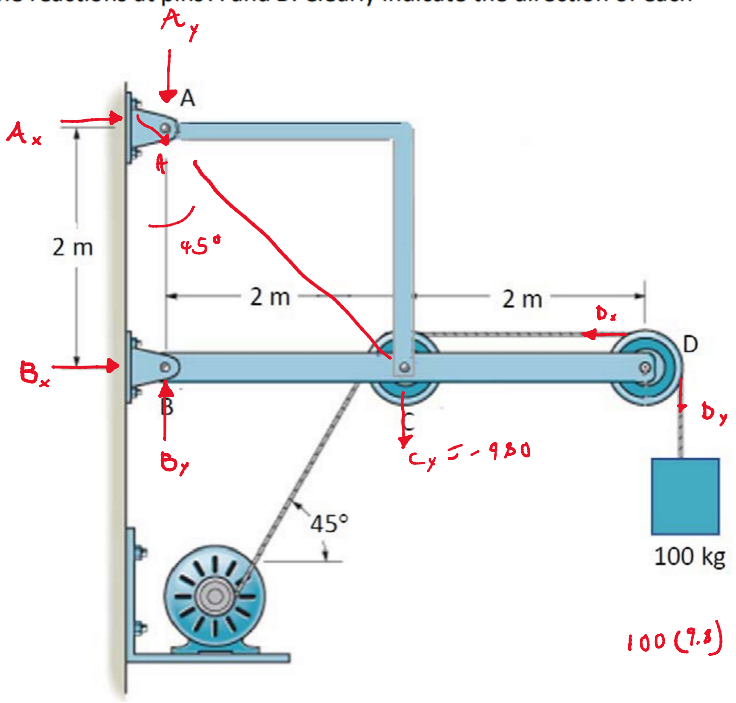
Final Exam Problem 2

Friday, December 18, 2020 8:01 AM

Problem 2.

A frame is designed to lift an object with a mass of 100 kg as shown in the figure. Assuming the system is in static equilibrium, determine the reactions at pins *A* and *B*. Clearly indicate the direction of each reaction in your final answer.



$\sum F_x = 0$

$B_x + A_x = 0$

$g \approx 9.8\ m/s^2$

$100(9.8) = 980\ N$

$\sum M_B = 0$

$-C\sin(45)(2) + 4(980) = 0$

$C = 2771.9\ N.$

$C_x = 1960\ N.$

$D_x = D_y$

$D_y = 980\ N.$

$D_x = 980\ N.$

$\sum F_y = 0$

$B_y - 980 + 1960 = 0$

$B_y = -980$

$\sum F_x = 0$

$\tan^{-1}\left(\frac{980}{1960}\right) = 26.57°$

$A_x = 1960\ N.$

$A_y = 1960\ N.$

$B_x = C_x = 1960\ N.$

$B = \sqrt{(1960)^2 + (-980)^2}$

$B = 2191.35\ N.$

$A = C = 2771.9\ N.$

A = 2771.9N. at 135° from the x-axis

B = 2191.4N. at -26.57° from the x-axis