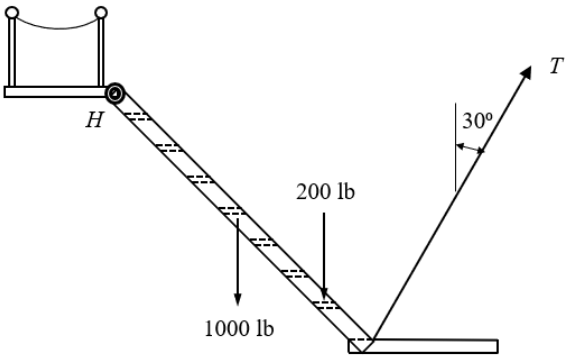
Problem 1 (10 points)

A ship's ladder is supported at the top by a hinge *H* (consisting of a horizontal and vertical reaction) and at the bottom by a rope with tension *T* pulling at 30 degree with respect to the vertical. The weight of the ladder is 1,000-lb and is considered to be concentrated at the center. A man weighting 200-lb stands at one-fifth distance from the bottom. The ladder itself is inclined at 45 degree.

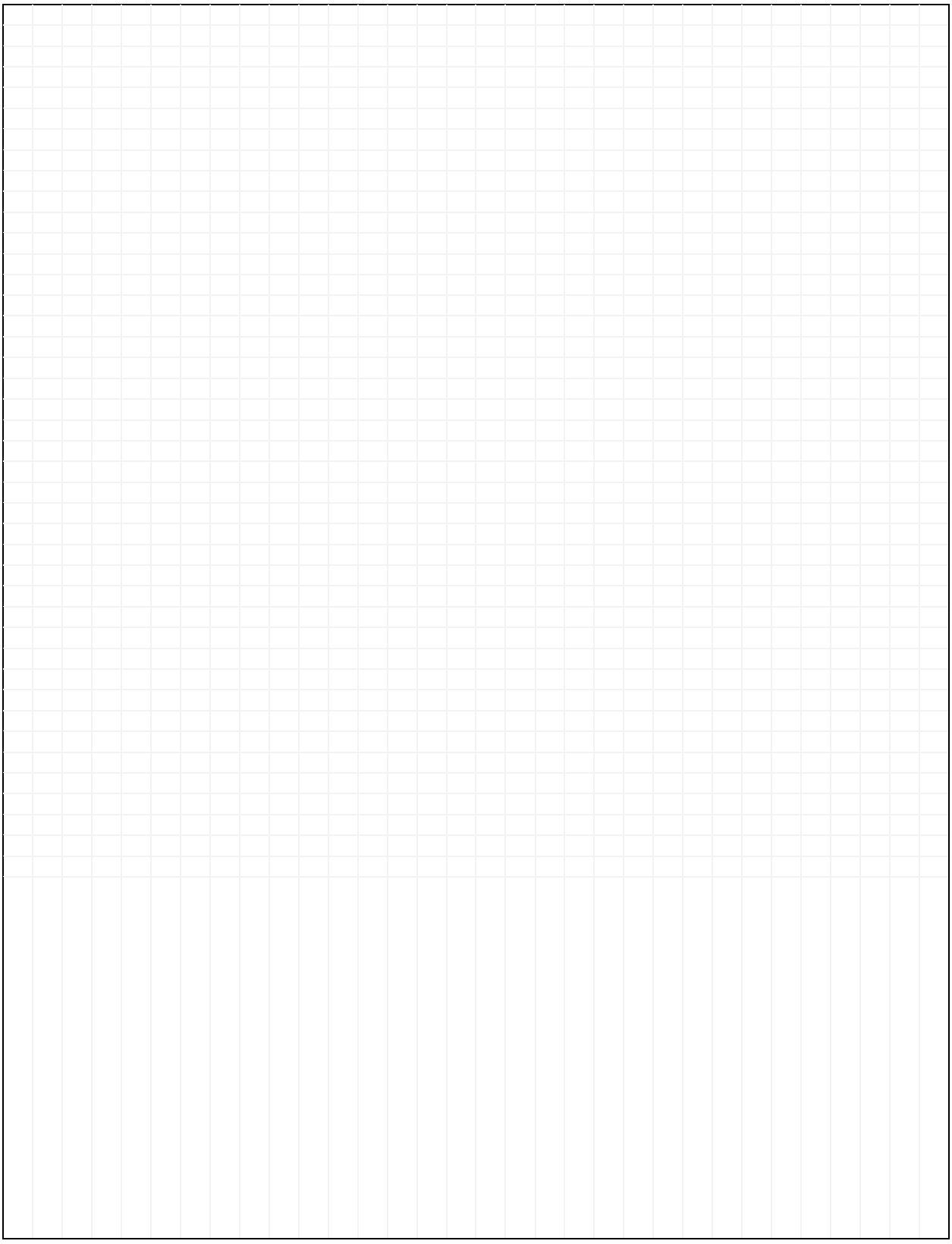


a) Draw the Free Body Diagram of the problem (5 points)

b) Knowing that a hinge is a point where the sum of moments about it equals zero and that H is a hinge, determine the pull in the rope T. (5 points)

T=

Additional Work Area:



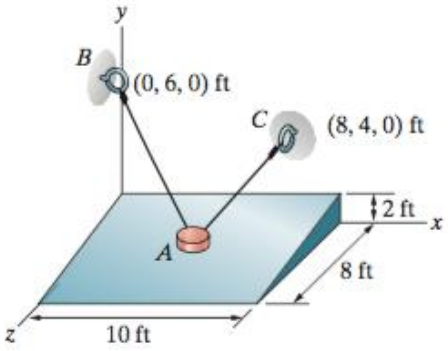
Problem 2 (10 points)

The 10 lb disk A is supported by the supported by the smooth inclined surface and the strings AB and AC. The disk is located at coordinates (5,1,4) ft.

a) Draw the Free Body Diagram of the problem (2 points)

b) Write the equilibrium equation in vector form. (no need to calculate the tension vectors) (1 point)

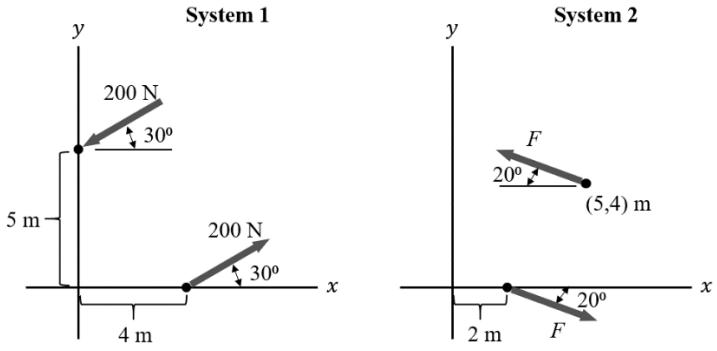
c) Determine the unit vector in the normal direction to the surface. (7 points)



Additional Work Area:

Problem 3 (10 points)

System 1 and 2 are equivalent. Determine force *F.*

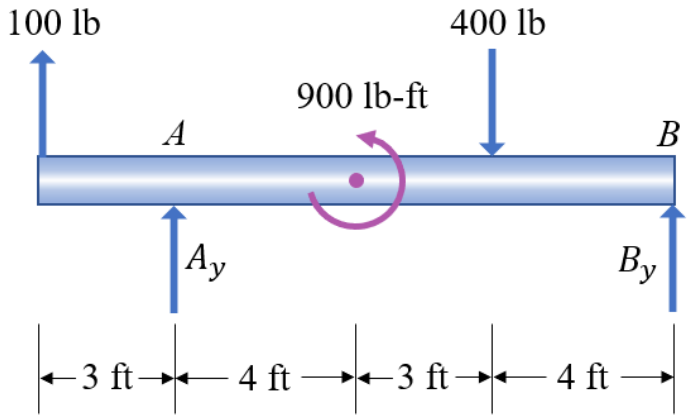


Additional Work Area:

Problem 4 (10 points)

Determine the vertical reactions A_y and B_y and clearly indicate their directions if:

(a) The sum of vertical forces equals 0;
(b) The sum of moments about *A* equals 0.



$A_y =$

$B_y =$

Additional Work Area: