MIDDLE EAST TECHNICAL UNIVERSITY

MECHANICAL ENGINEERING DEPARTMENT

ME 205 STATICS – FALL 2018

SECTION 1

HOMEWORK #2

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Assigned Date: 13.11.2018
Due Date: 20.11.2018
Due Time: 16.00
Grading Due Date: 04.12.2018

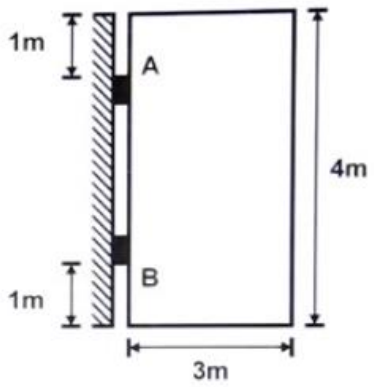
Please include your name, student ID, due date, a proper headline, page number with total page number, and units in your homework. Neatness will be graded.

1. A 80-kg door which is made of a uniform material is fixed by using two hinges at the points *A* and *B.* Assume that the reaction moments are zero at the hinges and it is required to find the reaction forces.

a. Is the given information enough to find all of the reaction forces? Prove your answer mathematically without using the actual equations to find the numerical answers. If there are any, comment on why some of the forces cannot be found. You may use the free body diagram of the system. *(15 pts)*

b. Find the reaction forces that can be obtained with the given information. *(25 pts)*

c. Do the reaction forces depend on the material uniformity or hinge locations? Explain it verbally. *(10 pts)*



2. The fitting at the elbow of a pipe is tightened with the wrench *B.* The pipe is fixed in a way that it can rotate freely about *y*-axis; however, it cannot translate or rotate along any other axes. Therefore, the wrench *A* is used to provide a stationary position for the pipe.

a. What is the moment about the axis *y,* that is produced by the force F_B if $F_B = 90\ N$? Solve by using vector algebra. *(25 pts)*

b. What is the counter force applied by F_A so that the pipe remains stationary? *(25 pts)*