TAM 210/211 - Written Assignment Instructions

To teach you how to prepare your analyses in a logical manner, you will be asked to submit an INDIVIDUAL assignment. Find below the requirements and guidelines for this written assignment:

1. Solutions should be NEAT. Do not cross out text or drawings. Make sure erasures are complete, i.e., that the previous text does not show through.
2. Your name and discussion session number must be printed legibly on the top of the first page.
3. Use plain white paper (with no lines) or engineering paper. It is acceptable to recycle, i.e. use the clean back-side of used sheets of paper.
4. Use proper units in case numerical values are given.
5. Use half page per problem.
6. Scan your report and save it in pdf format. Files in any other format will not be graded.
7. While scanning make sure you scan all the pages of your written report in ONE pdf file. We will only grade a single pdf file.
8. Your scanned work must be in portrait format.
9. IN SUMMARY, WE WILL ONLY GRADE REPORTS UPLOADED AS A PDF FILE, SINGLE DOCUMENT, PORTRAIT FORMAT! NO EXCEPTIONS!! Submitted assignments that do not comply with these guidelines will receive a ZERO score.

How to submit a written assignment

1. Written assignments will be posted on course website and compass 2g. Please log into compass 2g and go to course content, and click on the folder "Written Assignments"
2. Click on the available assignment, for example, Written Assignment 4
3. To save/read the problem statement, click on the attached file, e.g. WA4.pdf
4. To start the submission process, click on "Browse my computer" and select your scanned document.
5. After you are finished uploading your document, please click on "SUBMIT" to complete your submission.
6. You must be able to open your document from compass. Check the preview to verify your submission was completed successfully. Note that this preview cannot be upside down; TAs will be reading and grading your report directly from compass and will NOT download your document. If the document does not appear correctly on compass, your assignment will not be graded and therefore you will receive a zero score.
7. These assignments are due at 11:59pm. Late reports will not be accepted (you will not be able to upload it on compass 2g). No exceptions. DO NOT SEND YOUR LATE WRITTEN REPORT BY EMAIL.

Name:_____

TAM 210/211 Written Assignment 4, Fall 2017

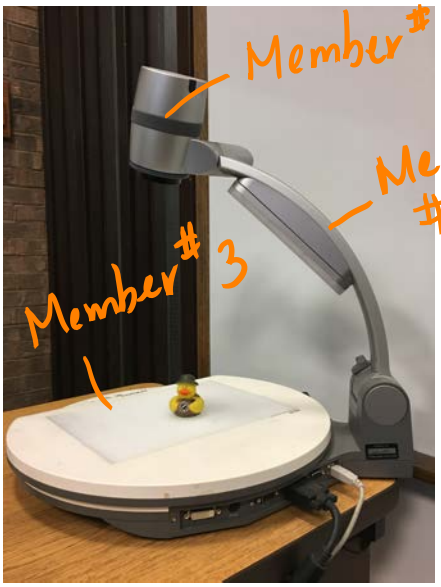
The **OBJECTIVE** of this written assignment is to practice **drawing free-body diagrams (FBD)**.

Find <u>three</u> objects that contain at least <u>three</u> members. For each object:

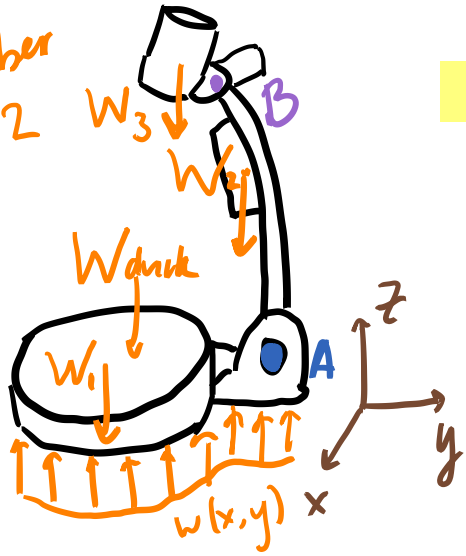
1. Identify the object and take a clear photo that shows how the members are connected.
2. Draw a FBD for the chosen object as a whole.
3. Draw a FBD for one of the members within the object.
4. Identify all 3D supports and all associated unknowns in your FBDs (see Table 5-2), and any assumption made (e.g. negligible mass, two force member, friction, center of gravity… etc.)

EXAMPLE

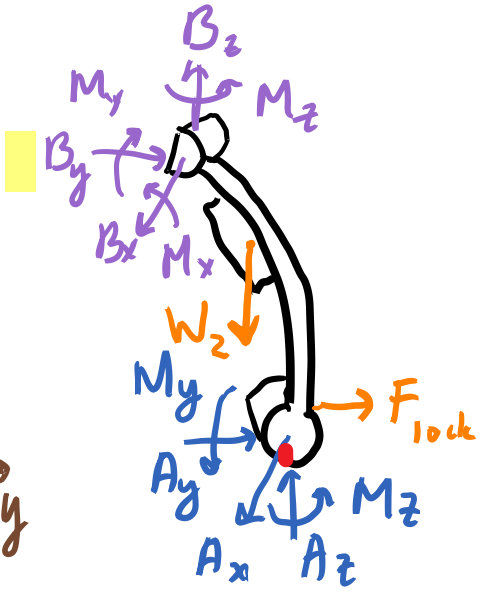
<u>Digital Presenter</u>



<u>FBD of the Presenter</u>



<u>FBD of the Arm</u>



<u>Assumptions</u>

- Support at A is a thrust bearing, support at B is a fixed support.
- Center of gravity for the base unit, the arm and the lamp are located at W_1, W_2 and W_3, respectively. Lubricant present at A eliminates friction in the joint.

TABLE 5–2 Supports for Rigid Bodies Subjected to Three-Dimensional Force Systems

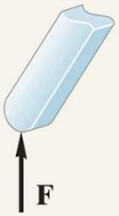
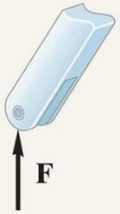
Types of Connection	Reaction	Number of Unknowns
(1)  cable		One unknown. The reaction is a force which acts away from the member in the known direction of the cable.
(2)  smooth surface support		One unknown. The reaction is a force which acts perpendicular to the surface at the point of contact.
(3)  roller		One unknown. The reaction is a force which acts perpendicular to the surface at the point of contact.

TABLE 5–2 Supports for Rigid Bodies Subjected to Three-Dimensional Force Systems

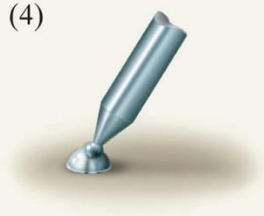
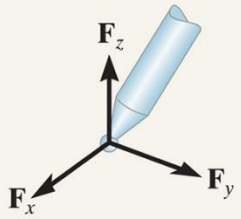
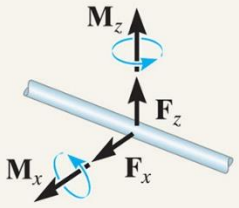
Types of Connection	Reaction	Number of Unknowns
(4)  ball and socket		Three unknowns. The reactions are three rectangular force components.
(5)  single journal bearing		Four unknowns. The reactions are two force and two couple-moment components which act perpendicular to the shaft. Note: The couple moments are *generally not applied* if the body is supported elsewhere. See the examples.

TABLE 5–2 Continued

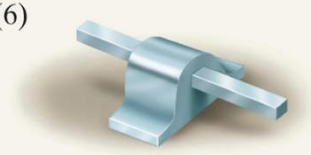
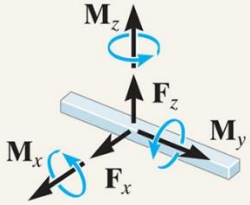
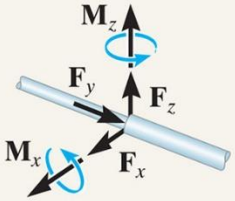
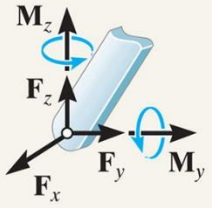
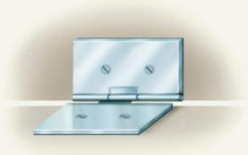
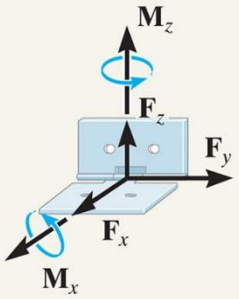
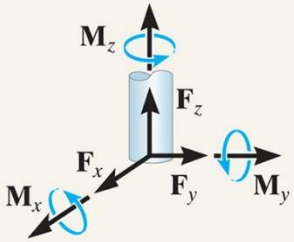
Types of Connection	Reaction	Number of Unknowns
(6)  single journal bearing with square shaft		Five unknowns. The reactions are two force and three couple-moment components. *Note*: The couple moments *are generally not applied* if the body is supported elsewhere. See the examples.
(7)  single thrust bearing		Five unknowns. The reactions are three force and two couple-moment components. *Note*: The couple moments *are generally not applied* if the body is supported elsewhere. See the examples.
(8)  single smooth pin		Five unknowns. The reactions are three force and two couple-moment components. *Note*: The couple moments *are generally not applied* if the body is supported elsewhere. See the examples.

TABLE 5–2 Continued

Types of Connection	Reaction	Number of Unknowns
(9)  single hinge		Five unknowns. The reactions are three force and two couple-moment components. *Note*: The couple moments *are generally not applied* if the body is supported elsewhere. See the examples.
(10)  fixed support		Six unknowns. The reactions are three force and three couple-moment components.