Université d'Ottawa
Faculté de génie

Département de
génie civil

uOttawa
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University of Ottawa
Faculty of Engineering

Department of
Civil Engineering

CVG 2140: Mechanics of Materials I

Midterm Exam / Examen de mi-session **February/ Février 15, 2013**
Drs. B. Martín-Pérez and W.T. Oh Time / Temps: **60 min.**

CLOSED BOOK. Attempt all three problems. Non-programmable calculators are allowed. Marks are as shown for each question. Clearly indicate the **coordinates** you are using.

Name of the student / Nom de l'étudiant:_____

StudentNumber / Numéro d'étudiant:_____

1. For the shape illustrated in Fig. 1, determine:
   a. The location of the centroid C; (20 points)
   b. The moment of inertias I_{Xc}, I_{Yc} with respect to its centroidal axes; and, (20 points)
   c. The maximum and minimum moments of inertia with respect to its centroidal axes. (10 points)

2. A hollow structural steel (E = 200 GPa) tube A with an outside diameter of 60 mm and an inside diameter of 50 mm is fastened to a 2014-T4 aluminum (E = 73 GPa) bar B that has a 50-mm diameter over one-half of its length (500 mm) and a 25-mm diameter over the other half (500 mm). The bar is loaded and supported as shown in Fig. 2.
   a. Draw the axial load diagram; (10 points)
   b. Calculate the overall change in length of the member; and, (20 points)
   c. Determine the maximum normal stress in the member. (20 points)

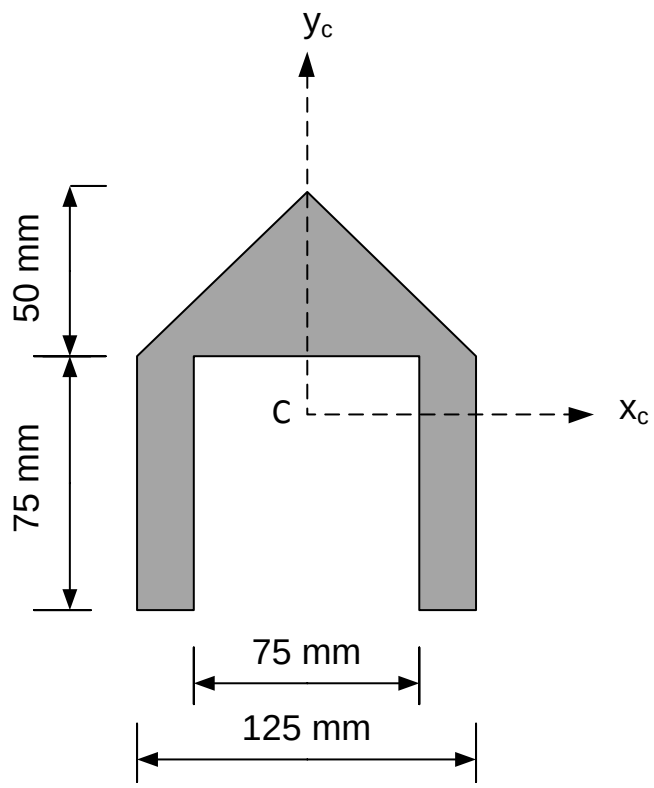

Figure 1

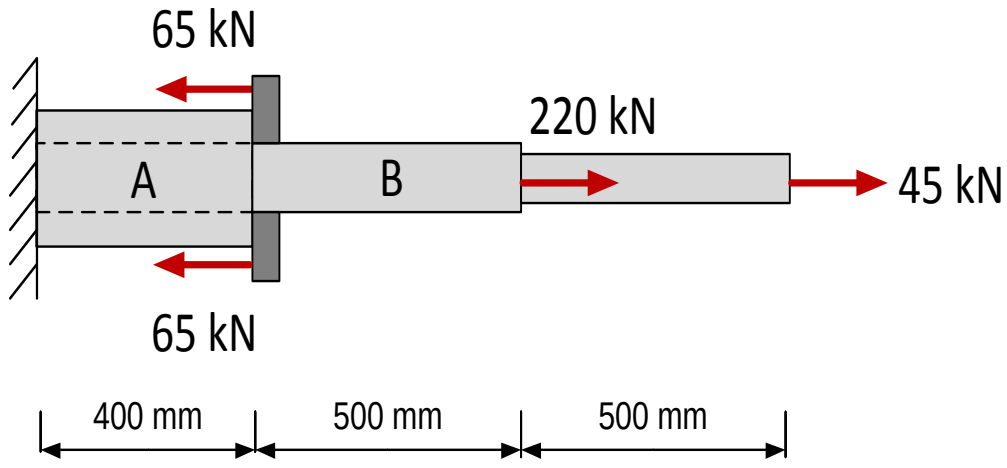

Figure 2