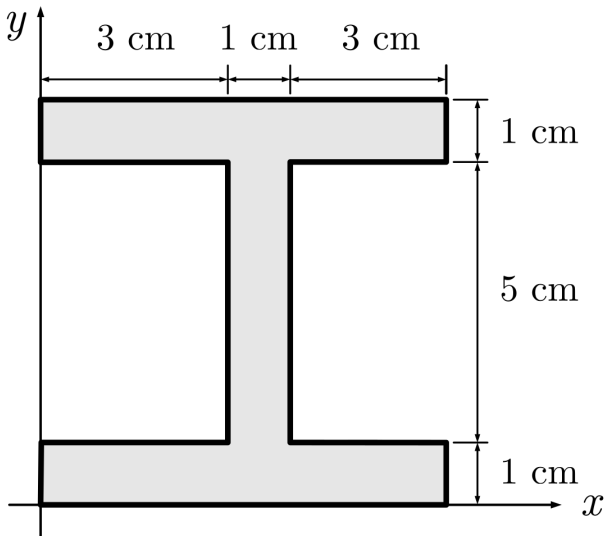
AEM 2011 Homework #6 (5.1) Friday, February 24, 2023

Unless otherwise mentioned, these problems should be solvable using a basic calculator. Practice clear communication by showing all work (free body diagrams, algebra, etc). This will be required to receive full credit on any graded problems.

1. (a) What are the coordinates of the centroid of the I-beam section shown?
   (b) Say we wanted to use the method of composite parts to confirm our answer. Finish the table below calculate the I-beam centroid.

Component	A_i	$\bar{x}_i$	$\bar{y}_i$	$\bar{x}_i A_i$	$\bar{y}_i A_i$
Top Rectangle					
Center Rectangle	5 cm^2				
Bottom Rectangle		3.5 cm	0.5 cm		
TOTALS:	$\sum A_i =$			$\sum \bar{x}_i A_i =$	$\sum \bar{y}_i A_i =$

- $\bar{x} = \frac{\sum \bar{x}_i A_i}{\sum A_i} =$
- $\bar{y} = \frac{\sum \bar{y}_i A_i}{\sum A_i} =$



Solution:

(a) $\bar{x} = \bar{y} = 3.5cm$

(b) Explanation: the cross section is symmetrical about both a vertical and horizontal centerline. The centroid is at the intersection, in the middle. The coordinates are measured from the origin, in the bottom left of the diagram.

2. Book problems:

   (a) 5.8

   (b) 5.30

   Additional Practice Problems: 5.8, 5.15, 5.25, 5.32

   The quiz problem will not be selected from these additional practice problems. However, these exercises contain important elements of the course and similar problems may appear on the exam.

Solution:

5.8 $\bar{X} = 1.653in$, $\bar{Y} = 17.46in$

5.30 120.0 mm