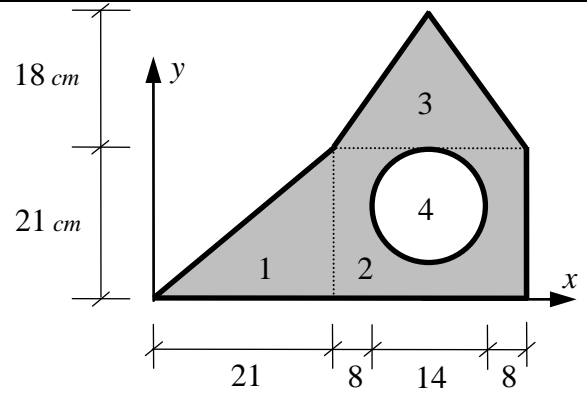


Name:

Code:

**Quiz (1): (10 Marks)**

- For the shown cross-section, determine the following:
- The location of the centroid.
  - The moments of inertia about the centroidal axes.
  - The direction of the principal axes.
  - The principal moments of inertia.



**Solution:**

Element	A	x	y	Ax	Ay	x-xb	y-yb	$I_x$	$A(y-yb)^2$	$I_y$	$A(x-xb)^2$	$I_{xyc}$	$I_{xy}$
1	220.50	14.00	7.00	3087.00	1543.50	-16.98	-6.75	5402.25	10056.21	5402.25	63583.49	2701.13	27987.66
2	630.00	36.00	10.50	22680.00	6615.00	5.02	-3.25	23152.50	6667.69	47250.00	15868.79	0.00	-10286.31
3	270.00	36.00	27.00	9720.00	7290.00	5.02	13.25	4860.00	47378.63	10125.00	6800.91	0.00	17950.42
4	-153.94	36.00	14.00	-5541.77	-2155.13	5.02	0.25	-1885.75	-9.37	-1885.75	-3877.48	0.00	-190.64
	966.56			29945.23	13293.37			31529.00	64093.15	60891.50	82375.71		35461.14

$x_b = 30.98 \text{ cm}$   
 $y_b = 13.75 \text{ cm}$

$I_x = 95622.15 \text{ cm}^4$   
 $I_y = 143267.21 \text{ cm}^4$

$I_u = 162164.76 \text{ cm}^4$   
 $I_v = 76724.60 \text{ cm}^4$

$\tan(2\theta) = 1.488555$   
 $2\theta = 56.11$   
 $\theta = 28.05$

