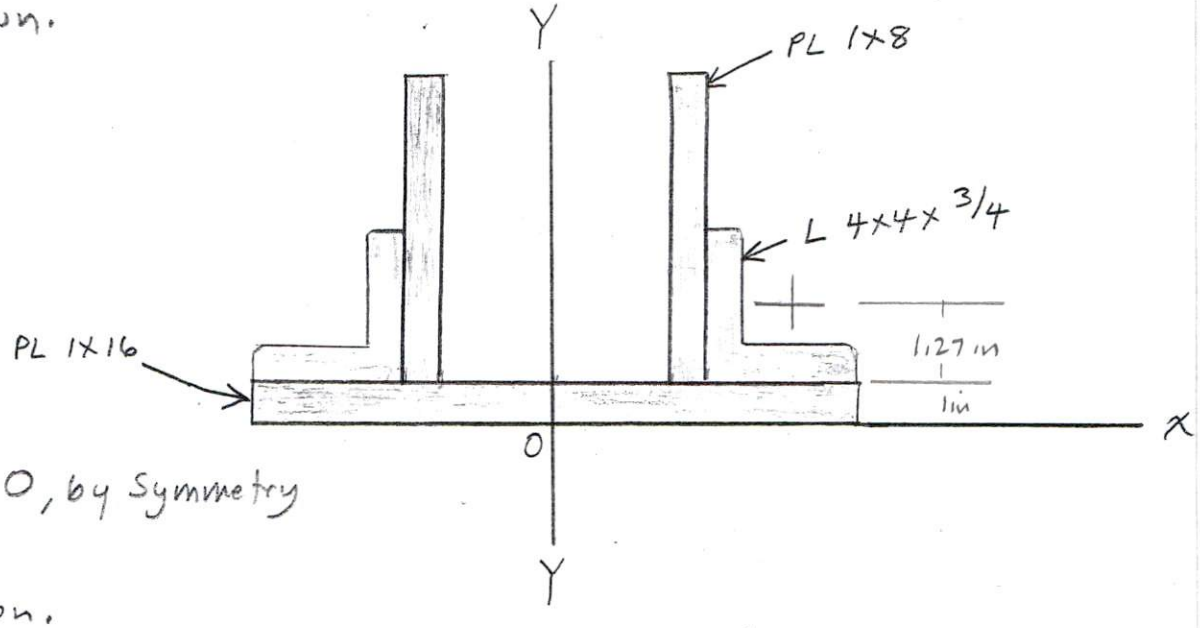
CMGT 350 QUIZ #6 Fall 2022

Show all work for Full credit

Name solution

1. For the Built-Up structural steel Section determine the location of the centroid for the Reference axis shown.



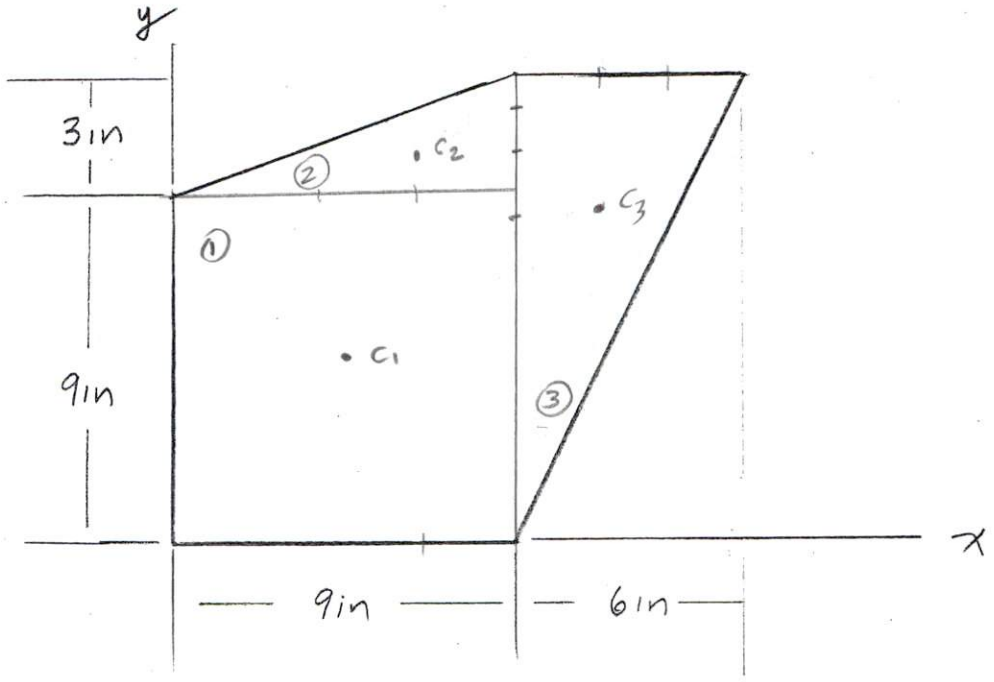
$\bar{X} = 0$, by Symmetry

Solution.

SHAPE	A (in^2)	y (in)	Ay (in^3)
PL 1×16	16	1/2	8
L 4×4×3/4	5.44	2.27	12.3488
L 4×4×3/4	5.44	2.27	12.3488
PL 1×8	8	5	40
PL 1×8	8	5	40
Σ	42.88		Σ 112.6976

$$\bar{y} = \frac{112.6976\ in^3}{42.88\ in^2} = 2.63\ in$$

2. Determine the centroid for the composite area for the given reference axis.



Solution,

Shape	A (in)	x (in)	Ax (in^3)	y (in)	Ay (in^3)
①	9×9 = 81	4.5	364.5	4.5	364.5
②	$\frac{1}{2}(9)(3)$ = 13.5	6	81	10	135
③	$\frac{1}{2}(12)(6)$ = 36	11	396	8	288
Σ	130.5	Σ	841.5	Σ	787.5

$$\bar{x} = \frac{\Sigma Ax}{\Sigma A} = \frac{841.5\ in^3}{130.5\ in^2} = 6.45\ in$$

$$\bar{y} = \frac{\Sigma Ay}{\Sigma A} = \frac{787.5\ in^3}{130.5\ in^2} = 6.03\ in$$