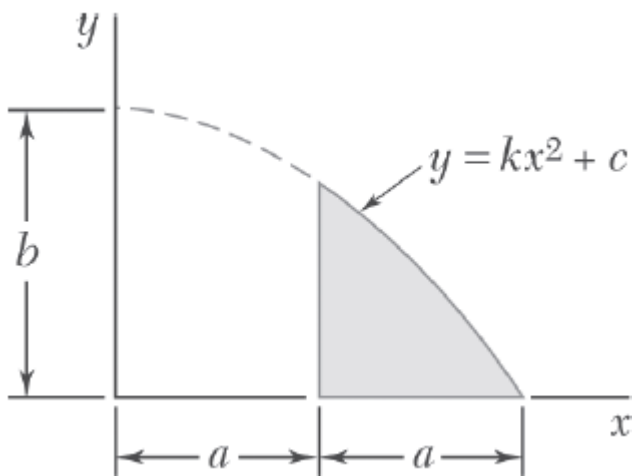


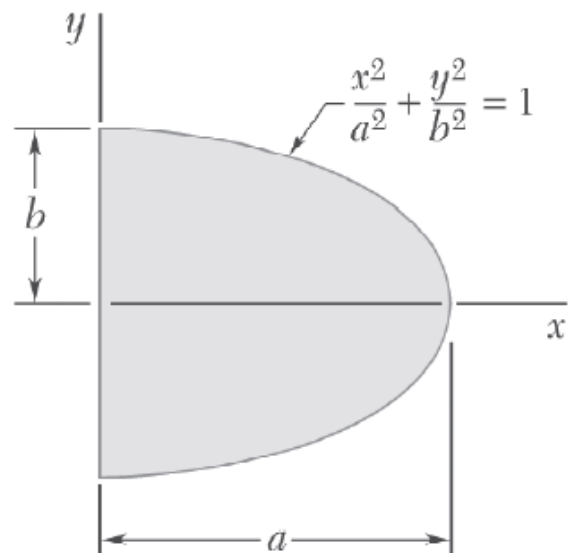
**Practice Problem Set 6: Engineering Mechanics (NMEC101)**  
**Centroid and Moment of Inertia**

Instruction: Figure numbers correspond to the problem numbers.

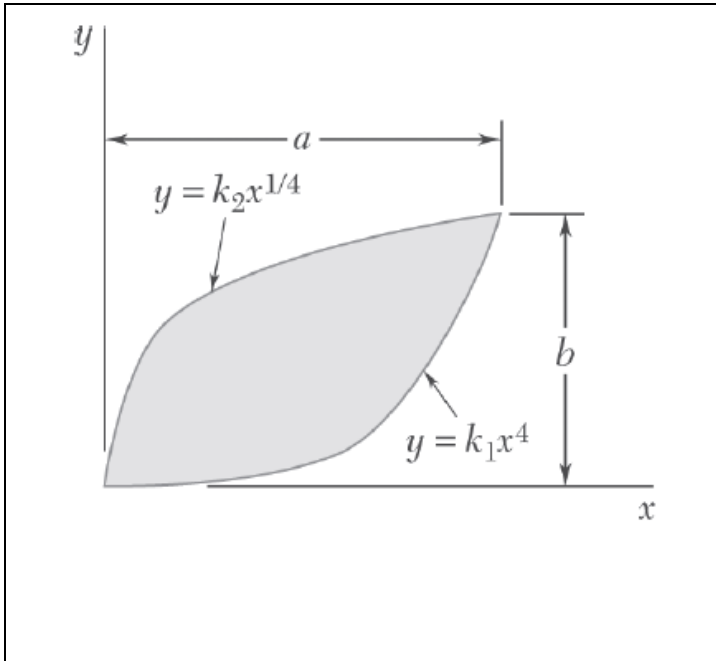
1. Determine by direct integration the moment of inertia of the shaded area with respect to the y-axis.
2. Determine by direct integration the moment of inertia of the shaded area with respect to the (a) x-axis, (b) y-axis.
3. Determine the moment of inertia of the shaded area shown with respect to the x-axis.
4. Determine the moments of inertia of the area shown with respect to centroidal axes respectively parallel and perpendicular to side AB.
5. (a) Determine by direct integration the product of inertia of the given area with respect to the x- and y- axes. (c) Use Mohr's circle to determine the orientation of the principal axes at the origin and the corresponding values of the moments of inertia. (c) Using Mohr's circle, determine the moments of inertia and the product of inertia with respect to new axes obtained by rotating the x- and y-axes about O through  $45^\circ$  counterclockwise, and through  $30^\circ$  clockwise.
6. For the area indicated, determine the orientation of the principal axes at the origin (centroid) and the corresponding values of the moments of inertia.



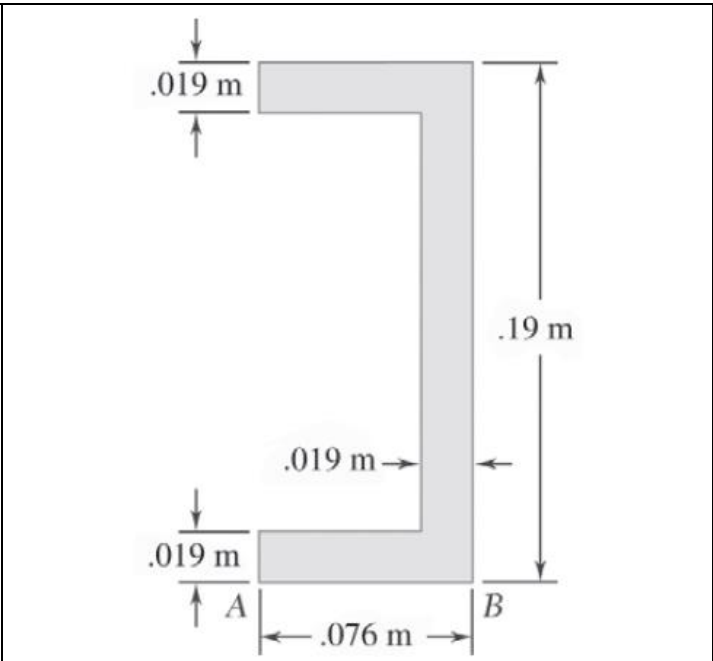
**Fig. 1**



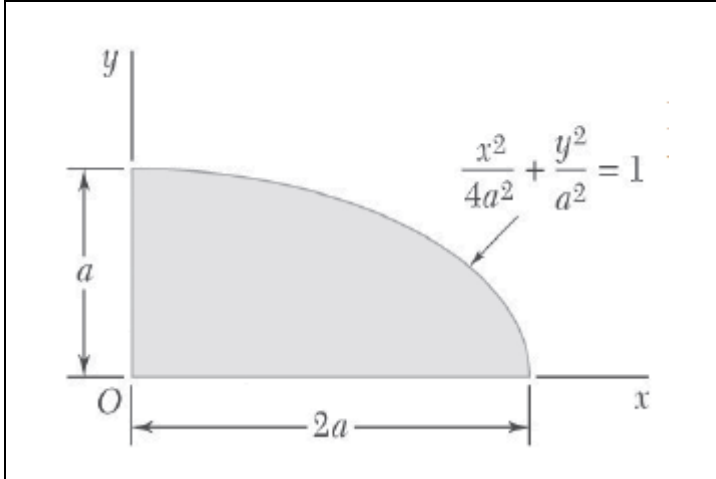
**Fig. 2**



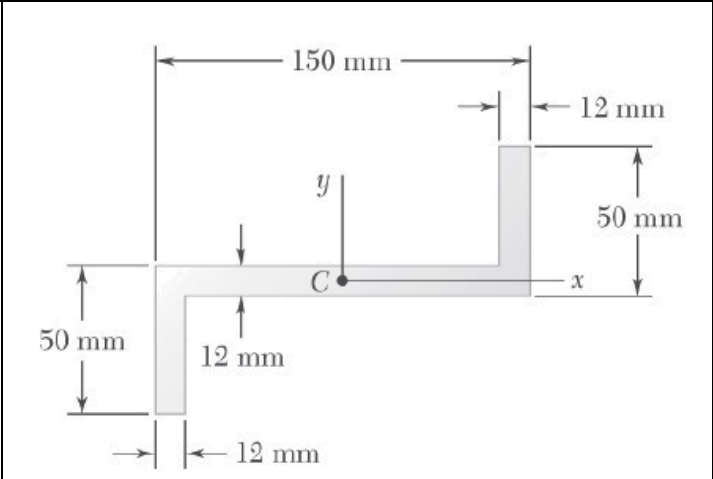
**Fig. 3**



**Fig. 4**



**Fig. 5**



**Fig. 6**