Problem 7. Given a circular disk with a thin plate welded to its center as shown, determine the moment of inertia of this disk about an axis perpendicular to the page and passing through the pin at A. The thickness of the plate and disk are each **t = 0.25"** and the material has a density of $\rho = 0.0132$ **slugs/in³**.

12 in.
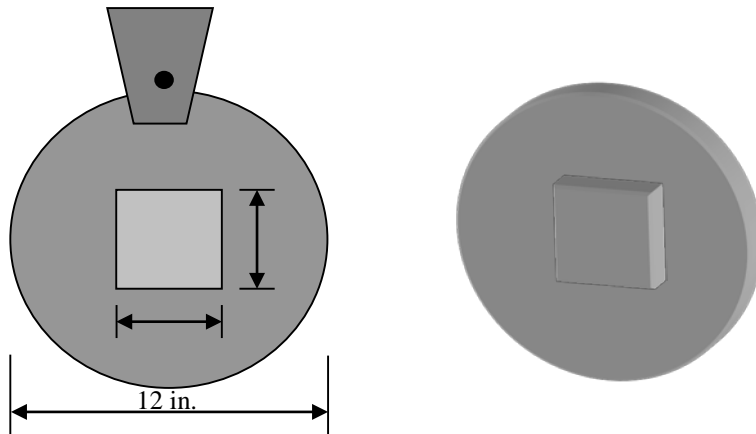
$Vol_{DISK} = \pi r^2 t = 3.14(6)^2(.25) = 28.26\,in^3$ 12 in

$M_{DISK} = \rho\,Vol = .0132(28.26) = 0.373$ slug

$Vol_{plate} = 4 \times 4 \times 0.25 = 4\,in^3$

$M_{plate} = \rho\,Vol = 0.0132(4) = 0.0528$ slug

$I_{G\,DISK} = \frac{1}{2}mr^2 = \frac{1}{2}(.373)(6)^2 = 6.714$ slug-in²

$I_{G\,PLATE} = \frac{1}{12}(a^2+b^2)m = \frac{1}{12}(4^2+4^2)(.0528) = 0.1408$ slug in²

SHAPE	MASS	I_G	md^2	$I_G + md^2$
◯	0.373	6.714	$.373(6)^2$ = 13.43	6.714+13.43 = 20.142
▢	0.0528	0.1408	$0.0528(6)^2$ = 1.9	0.1408+1.9 = 2.04

Σ 22.2

$\underline{I_A = 22.2\ slug\text{-}in^2}$

Answer: I_A = 22.2 slug.in²