Remarks: See §3.1.4, example 4, pages 86 till 87
See §3.2.4, example 8, pages 116 till 119

Answers:

a. $A = \alpha R^2$

b. $S_y = \frac{2}{3} R^3 \sin\alpha$
$S_z = 0$

c. $y_C = \frac{2}{3} R \frac{\sin\alpha}{\alpha}$
$z_C = 0$

d. $I_{yy} = \frac{1}{8} R^4 (\sin 2\alpha + 2\alpha)$
$I_{zz} = \frac{1}{4} \alpha R^4$
$I_{yz} = I_{zy} = 0$

e. $I_{yy;centr} = \frac{1}{8} R^4 (\sin 2\alpha + 2\alpha) - \frac{4}{9} R^4 \frac{\sin^2\alpha}{\alpha}$
$I_{zz;centr} = \frac{1}{4} \alpha R^4$
$I_{yz;centr} = I_{zy;centr} = 0$

Check Answers:

$\alpha = \frac{\pi}{2}$ (half disk):

$A = \frac{\pi}{2} R^2 ;\ S_y = \frac{2}{3} R^3 ;\ S_z = 0$

$y_C = \frac{4R}{3\pi}$ en $z_C = 0$

$I_{yy} = I_{zz} = \frac{\pi R^4}{8}$ en $I_{yz} = I_{zy} = 0$

$I_{yy;centr} = R^4 \left( \frac{\pi}{8} - \frac{8}{9\pi} \right)$ en $I_{zz;centr} = \frac{\pi R^4}{8}$

$I_{yz;centr} = I_{zy;centr} = 0$

$\alpha = \pi$ (disk):

$A = \pi R^2 ;\ S_y = S_z = 0$

$I_{yy} = I_{zz} = \frac{1}{4} \pi R^4$ en $I_{yz} = I_{zy} = 0$

$y_C = z_C = 0$

$I_{yy;centr} = I_{zz;centr} = \frac{1}{4} \pi R^4$

$I_{yz;centr} = I_{zy;centr} = 0$