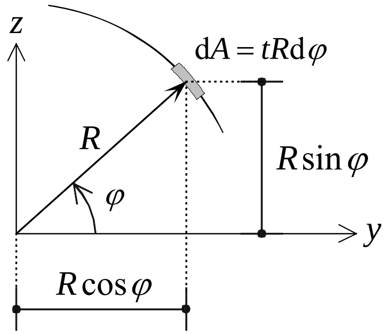
Remarks: See §3.1.4, example 3, pages 85 till 86

Answers 3.10-1:

a. $A = \frac{1}{2}\pi R t$

b. $y_C = \dfrac{2R}{\pi}$; $z_C = \dfrac{2R}{\pi}$



Explanation 3.10-1:

$$A = \int_0^{\pi/2} t \cdot R\mathrm{d}\varphi = Rt\varphi\Big|_0^{\pi/2} = \frac{\pi R t}{2}$$

$$S_y = \int_0^{\pi/2} R\cos\varphi \cdot tR\mathrm{d}\varphi = R^2 t \sin\varphi\Big|_0^{\pi/2} = R^2 t$$

$$S_y = \int_0^{\pi/2} R\sin\varphi \cdot tR\mathrm{d}\varphi = -R^2 t \cos\varphi\Big|_0^{\pi/2} = R^2 t$$

$$y_C = z_C = \frac{R^2 t}{\frac{\pi R t}{2}} = \frac{2R}{\pi}$$

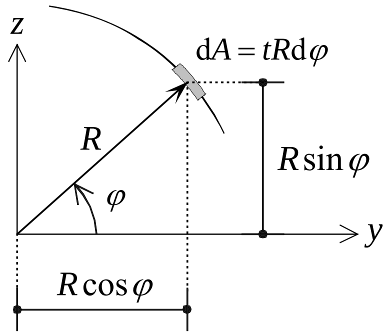
Remarks: See §3.1.4, example 3, pages 85 till 86

Answers 3.10-2:

a. $A = \pi R t$

b. $y_C = 0\,;\; z_C = \dfrac{2R}{\pi}$

Explanation 3.10-2:



$$A = \int_0^\pi t \cdot R\mathrm{d}\varphi = Rt\varphi\Big|_0^\pi = \pi R t$$

$$S_y = \int_0^\pi R\cos\varphi \cdot tR\mathrm{d}\varphi = R^2 t \sin\varphi\Big|_0^\pi = 0$$

$$S_y = \int_0^\pi R\sin\varphi \cdot tR\mathrm{d}\varphi = -R^2 t \cos\varphi\Big|_0^\pi = 2R^2 t$$

$$y_C = \frac{0}{\pi R t} = 0$$

$$z_C = \frac{2R^2 t}{\pi R t} = \frac{2R}{\pi}$$