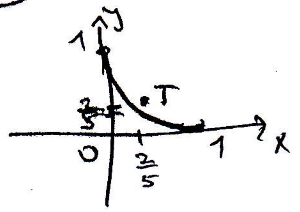
(7) Asteroida $x(t)=\cos^3 t$, $y=\sin^3 t$, $t\in[0,\pi/2]$.



$$x'=3\cos^2 t\,(-\sin t)$$
$$y'=3\sin^2 t\cos t.$$

$$H=d=\int_0^{\frac{\pi}{2}}\sqrt{x'^2+y'^2}\,dt=\int_0^{\frac{\pi}{2}}\sqrt{9\cos^4 t\sin^2 t+9\sin^4 t\cos^2 t}$$
$$=\int_0^{\frac{\pi}{2}}3\cos t\sin t\,dt=\frac{3}{2}\int_0^{\frac{\pi}{2}}\sin 2t\,dt$$
$$=\frac{3}{2}\left[\frac{-\cos 2t}{2}\right]_0^{\frac{\pi}{2}}=\frac{3}{2}\left[\frac{-\cos\pi}{2}+\frac{1}{2}\right]=\frac{3}{2}$$

0.6

$$S_x=\int_0^{\frac{\pi}{2}}y\sqrt{x'^2+y'^2}\,dt=\int_0^{\frac{\pi}{2}}\sin^3 t\cdot 3\cos t\sin t\,dt=3\int_0^{\frac{\pi}{2}}\sin^4 t\cos t\,dt$$

$$\left|\begin{array}{l}u=\sin t\\ du=\cos t\,dt\\ t=0\Rightarrow u=0\\ t=\frac{\pi}{2}\Rightarrow u=1\end{array}\right|=3\int_0^1u^4\,du=3\left[\frac{u^5}{5}\right]_0^1=\frac{3}{5}$$

0,6

$$S_y=\int_0^{\frac{\pi}{2}}x\sqrt{x'^2+y'^2}\,dt=\int_0^{\frac{\pi}{2}}\cos^3 t\,3\cos t\sin t\,dt=3\int_0^{\frac{\pi}{2}}\cos^4 t\sin t\,dt$$

$$\left|\begin{array}{l}u=\cos t\\ du=-\sin t\,dt\\ t=0\Rightarrow u=1\\ t=\frac{\pi}{2}\Rightarrow u=0\end{array}\right|=3\int_1^0u^4(-du)=3\int_0^1u^4\,du=\frac{3}{5}$$

0.6

$$\frac{S_x}{H}=\frac{S_y}{H}=\frac{\frac{3}{5}}{\frac{3}{2}}=\frac{6}{15}=\frac{2}{5}\Rightarrow\boxed{T=\left[\frac{2}{5},\frac{2}{5}\right]}$$

0.2

2.0