MATH 53 28 Jan 08

GSI: Theo Johnson-Freyd
http://math.berkeley.edu/~theojf/

① Last time, we considered a rotating line orbitting another line. A point on the perimeter of the moving line follows a parameterized curve

$$x = 2r\sin\theta - r\sin 2\theta$$
$$y = 2r\cos\theta - r\cos 2\theta$$

(a) What is the area inscribed by this curve?

(b) What is the line tangent to the curve at time θ?

② More generally, consider a rotating planet orbitting in a perfect circle in the plane. A person ~~on~~ standing on the surface of the planet follows a path

$$x = R\sin\left(\frac{2\pi}{\text{year}}t\right) - r\sin\left(\frac{2\pi}{\text{day}}t\right)$$

$$y = R\cos\left(\frac{2\pi}{\text{year}}t\right) - r\cos\left(\frac{2\pi}{\text{day}}t\right)$$

where "year" and "day" are the ~~length~~ periods of the orbit and the rotation, and r is the radius of the planet and R is the distance from the center of the planet to the center of the sun. What is the speed of the person's path through space?