

§ 10.1 #21 Describe the motion of a particle with position (x, y) as t varies in the given interval

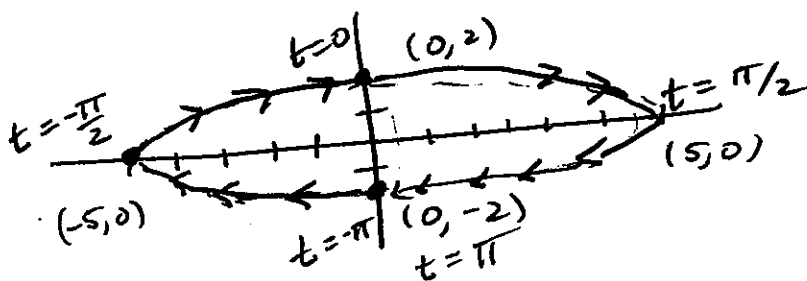
$$x = 5 \sin t, \quad y = 2 \cos t, \quad -\pi \leq t \leq 5\pi$$

$$\frac{x^2}{25} + \frac{y^2}{4} = \frac{(5 \sin t)^2}{25} + \frac{(2 \cos t)^2}{4}$$

$$= \frac{25 \sin^2 t}{25} + \frac{4 \cos^2 t}{4}$$

$$= \sin^2 t + \cos^2 t = 1$$

$\frac{x^2}{25} + \frac{y^2}{4} = 1$ is an ellipse



when $y=0$

$$\frac{x^2}{25} = 1$$

$$x = \pm 5$$

when $x=1$

$$\frac{y^2}{4} = 1$$

$$y = \pm 2$$

| t | x | y |
|----------|-----|-----|
| $-\pi$ | 0 | -2 |
| $-\pi/2$ | -5 | 0 |
| 0 | 0 | 2 |
| $\pi/2$ | 5 | 0 |
| π | 0 | -2 |
| 5π | 0 | -2 |

The particle goes in a counter clockwise path around the ellipse, starting at $(0, -2)$, going around 3 times, ending at $(0, -2)$