

Lecture due Oct 5, 2021 20:30 IST



Practice

Circle 1

1/1 point (graded)

In lecture, we saw the parametric equations for the unit circle. More generally, one may consider the equations

$$x(t) = a + r\cos t \tag{6.95}$$

$$y(t) = b + r\sin t \tag{6.96}$$

where
$$0 \le t < 2\pi$$
 (6.97)

What is the resulting trajectory?

$lacksquare$ A circle centered at (a,b) with radius $oldsymbol{r}$.
$igcap$ A circle centered at (a,b) with radius r^2 .
$igcap$ A circle centered at (b,a) with radius $m{r}$.
igcap A circle centered at $(0,0)$ with radius $a+b+r$.
None of the above

Solution:

The new radius is r, because the trajectory will be the unit circle scaled by r. The a and b terms serve to translate the x coordinate by a units to the right, and the y coordinate by b units up. The the correct choice is "A circle centered at (a,b) with radius r.".

Submit

You have used 1 of 2 attempts

1 Answers are displayed within the problem

Circle 2

1/1 point (graded)

Now consider the equations:

$$x\left(t\right) = \sin t \tag{6.98}$$

$$y(t) = \cos t \tag{6.99}$$

where
$$0 \le t < \pi$$
 (6.100)

What is the resulting trajectory?

igorplus A semi-circle contained in the $x\geq 0$ half-plane. igorplus Calculator igorplus Hide Notes

A semi-circle contained in the $y \ge 0$ half-plane. A semi-circle contained in the $y \le 0$ half-plane. None of the above Solution: We still have $x^2 + y^2 = 1$, so the trajectory is contained in a unit circle. By plotting points, we can see that x will nove from 0 , up to 1 , then back to 0 . Similarly, we find that y moves from 1 to -1 . Therefore, the correct choice is the semi-circle in the $x \ge 0$ half-plane. Submit You have used 1 of 2 attempts On Answers are displayed within the problem Circular Parametric A point (graded) Consider the unit circle given by $x^2 + y^2 = 1$. Which of the following parametric equations describes this curve or $t > 0$? $\vec{r}_1 = \begin{pmatrix} \cos t \\ \sin t \end{pmatrix}, \vec{r}_2 = \begin{pmatrix} \cos (-t) \\ \sin (-t) \end{pmatrix} \qquad (6.101)$ $\vec{r}_3 = \begin{pmatrix} \sin t \\ \cos t \end{pmatrix}, \vec{r}_4 = \begin{pmatrix} t \\ \sqrt{1-t^2} \end{pmatrix} \qquad (6.102)$
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$\vec{r}_3 = \begin{pmatrix} \sin t \\ \cos t \end{pmatrix}, \vec{r}_4 = \begin{pmatrix} t \\ \sqrt{1 - t^2} \end{pmatrix}$ (6.102)
$ec{m{r}}_1$
$ec{m{r}}_2$
$ec{m{r}}_3$
$ec{r}_4$
olution:
though $ec r_1$, $ec r_2$ and $ec r_3$ have generally different motions, they all eventually trace out the unit circle trajectory.
ne $ec r_4$ option could only trace out the top half of the circle, and for $t>0$ we only get a quarter of the circle. In thermore, the domain of $ec r_4$ is restricted to $t<1$.
Submit You have used 2 of 2 attempts

2. Circular Trajectories

Topic: Unit 5: Curves and Surfaces / 2. Circular Trajectories



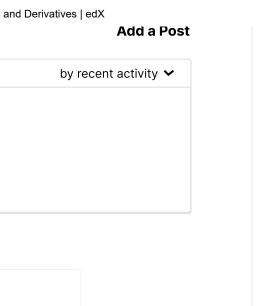
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