

Parametric Equations Worksheet Answers

1) Since a circle of radius a has parametric equations $x = acost$, $y = a sint$ in the ccw direction and $x = acost$, $y = -a sint$ in the cw direction,

a) starting at the point $(0, 2)$ with counterclockwise orientation,

$$x = 2\cos(t + \pi/2) = -2\sin t; \text{ and } y = 2\sin(t + \pi/2) = 2\cos t.$$

b) starting at the point $(-2, 0)$ with clockwise orientation,

$$x = 2\cos(t + \pi) = -2\cos t; \text{ and } y = -2\sin(t + \pi) = 2\sin t.$$

c) starting at the point $(0, -2)$ with counterclockwise orientation,

$$x = 2\cos(t - \pi/2) = 2\sin t; \text{ and } y = 2\sin(t - \pi/2) = -2\cos t.$$

2) Find the values of t that will trace a circle (once) with parametric equations

a) $0 \leq 3t < 2\pi$ or $0 \leq t < 2\pi/3$

b) $0 \leq t/3 < 2\pi$ or $0 \leq t < 6\pi$

3) Eliminate the parameter to find the Cartesian equation. Indicate the direction of increasing t . Graph the equation by hand. Check your answer with your grapher.

a) $x = 2y + 6$, $x : [-2, 10]$, $y : [-4, 2]$

b) $y - 4 = (x - 1)^2/4$ $x : [-5, 1]$, $y : [4, 13]$

c) $(\frac{x}{2})^2 + 4y^2 = 1$

d) $y = 1/x$

e) $(x - 2)^2 + (y - 3)^2 = 1$

f) $y = -\ln(x)$

4) Intersection points $(20,4)$ at $t = 2$, and $(30,9)$ at $t = 3$. No collision.

5) Intersection point $(15,5)$ at $t = 1/2$, collision point $(120,3200)$ at $t = 4$.

6) $y = 1$

7) $y' = -\frac{\sqrt{3}}{2}$; $y'' = \frac{1}{4}$

8) a) HTL $t = -1/2$, b) VTL $t = \pm 1$.

9) a) $L = \frac{2}{3}(6\sqrt{6} - 5\sqrt{5})$ b) $L = \sqrt{2}(e - 1)$

10) a) $x = 250\sqrt{3}t$, $x = -2 + 250t - 4.9t^2$ b) $22,089m$ c) $3,187m$

11) $t = \frac{168}{40\sqrt{3}}$, $y = 5.91ft$; No.

12) a) $t = \frac{136\sin(29)}{32}$ $y \approx 70.4ft$ b) $t \approx 4.036$, $x \approx 480ft$