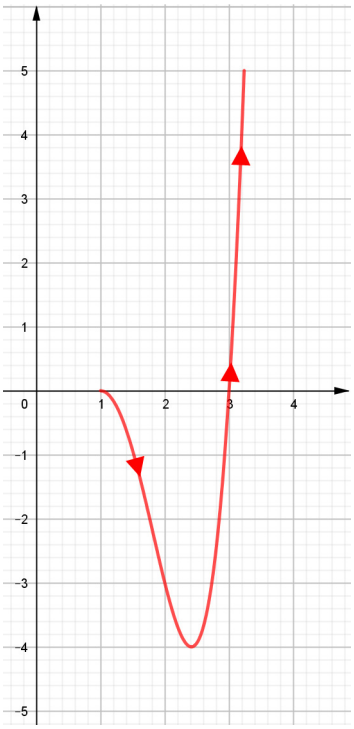
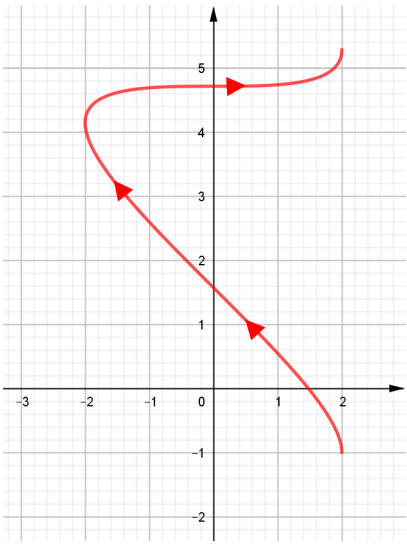
Sketch the curve by using the parametric equations to plot points. Indicate with an arrow the direction in which the curve is traced at t increases.

1) $x = 1 + \sqrt{t}, \quad y = t^2 - 4t, \quad 0 \le t \le 5$



2) $x = 2\cos t, \quad y = t - \cos t, \quad 0 \le t \le 2\pi$



Eliminate the parameter to find a Cartesian equation of the curve.

3) $x = 1 + 3t, \quad y = 2 - t^2$ $\boxed{y = -\frac{1}{9}(x-1)^2 + 2}$

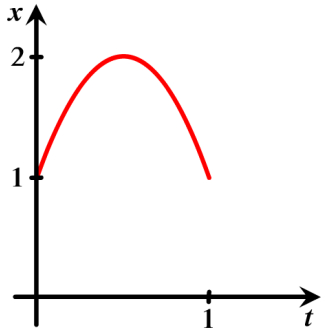
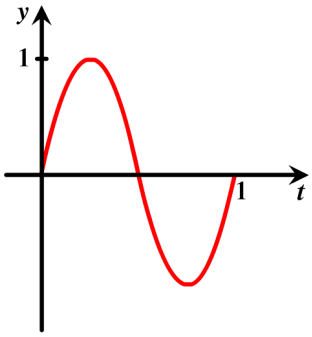
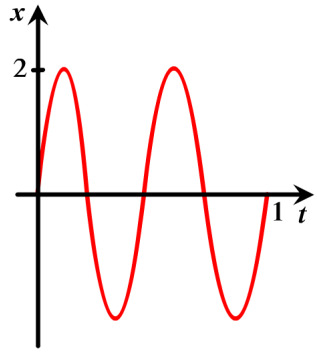
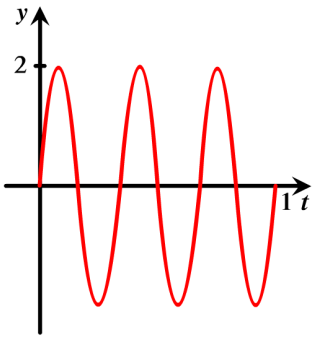
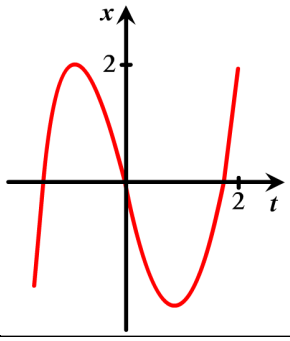
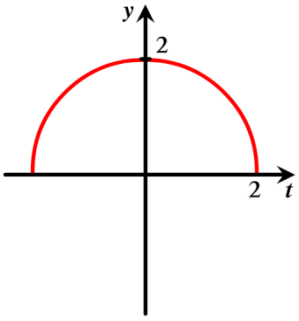
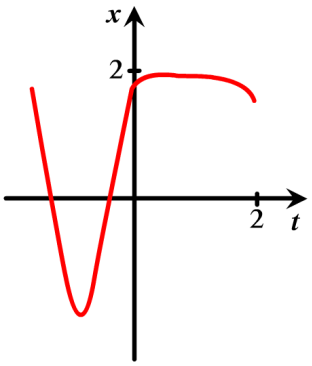
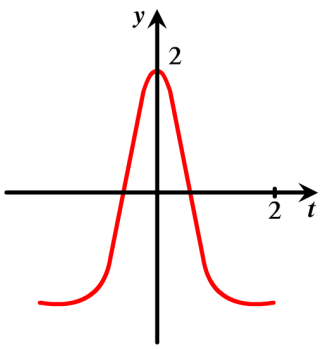
4) $x = t^2, \quad y = t^3$ $\boxed{x = y^{2/3}}$

5) $x = \sin\theta, \quad y = \cos\theta, \quad 0 \le \theta \le \pi$ $\boxed{x^2 + y^2 = 1, \quad x \ge 0}$

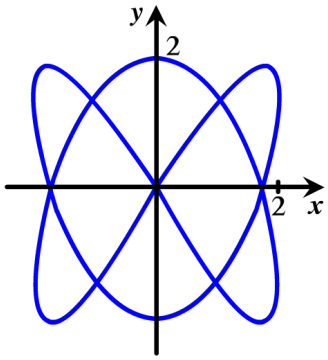
6) $x = \sin^2\theta, \quad y = \cos^2\theta$ $\boxed{x + y = 1, \quad 0 \le x \le 1}$

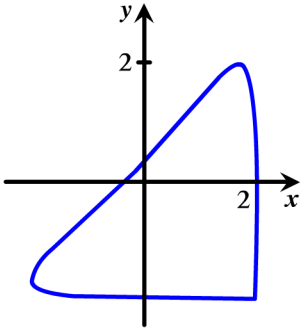
7) $x = \ln t, \quad y = \sqrt{t}, \quad t \ge 1$ $\boxed{y = e^{x/2}, \quad x \ge 0}$

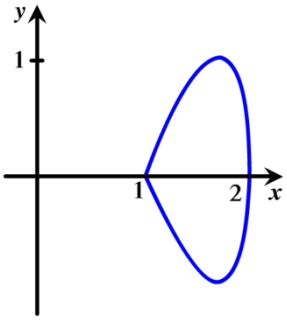
Match the graphs of the parametric equations $x = f(t)$ and $y = f(t)$ in (a)-(d) with the parametric curves labeled I-IV. a) III b) I c) IV d) II

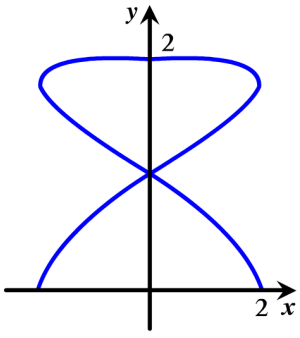
$x = f(t)$	$y = f(t)$
a) 	
b) 	
c) 	
d) 	

$y = f(x)$

I 

II 

III 

IV 

8) Match the parametric equations with the graphs labeled I-VI. (Do not use a graphing device.)

a) $x = t^3 - 2t, \quad y = t^2 - t$ IV

b) $x = t^3 - 1, \quad y = 2 - t^2$ VI

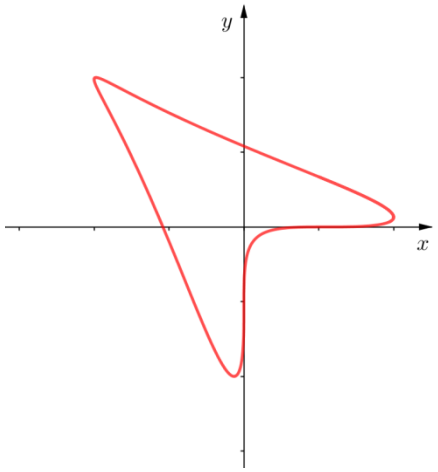
c) $x = \sin 3t, \quad y = \sin 4t$ V

d) $x = t + \sin 2t, \quad y = t + \sin 3t$ III

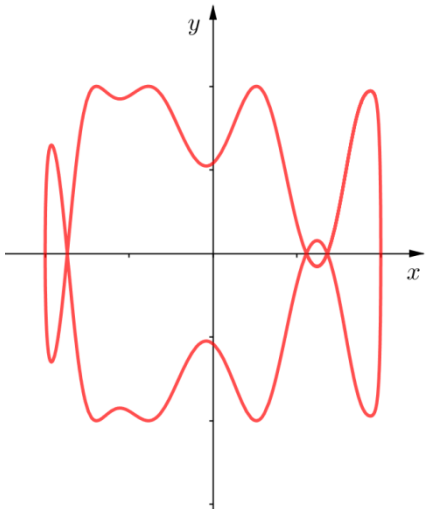
e) $x = \sin(t + \sin t), \quad y = \cos(t + \cos t)$ I

f) $x = \cos t, \quad y = \sin(t + \sin 5t)$ II

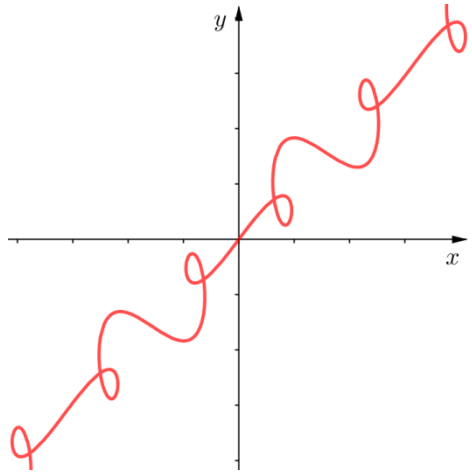
I



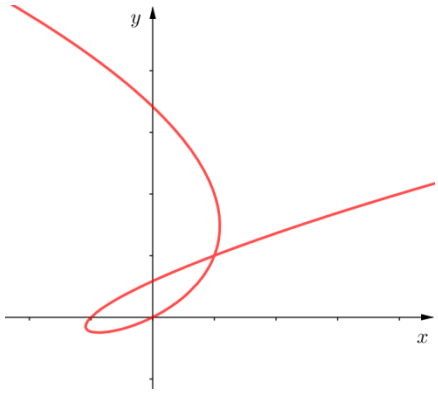
II



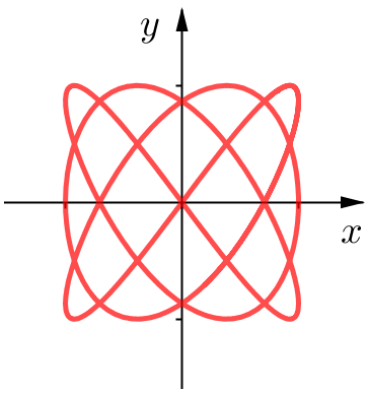
III



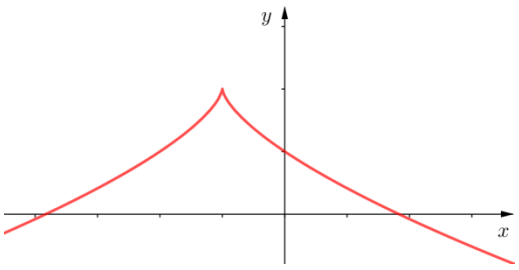
IV



V



VI



9) Use a graphing device to graph the curves $y = x^5$ and $x = y(y-1)^2$ and find their points of intersection correct to one decimal place.

$\boxed{(1.1,\ 1.8)}$

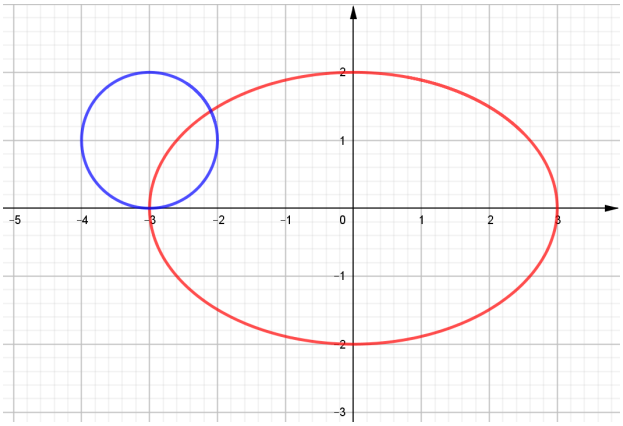
10) Suppose that the position of one particle at time t is given by:

$$x_1 = 3\sin t, \quad y_1 = 2\cos t, \quad 0 \le t \le 2\pi$$

and the position of a second particle is given by:

$$x_2 = -3 + \cos t, \quad y_2 = 1 + \sin t, \quad 0 \le t \le 2\pi$$

a) Graph the paths of both particles. How many points of intersection are there?



$\boxed{(-3, 0) \text{ and } (-2.1,\ 1.4)}$

b) Are any of these points of intersection collision points? In other words, are the particles ever at the same place at the same time? If so, find the collision points. $\boxed{t = \dfrac{3\pi}{2}}$

c) Describe what happens if the path of the second particle is given by:

$$x_2 = 3 + \cos t, \quad y_2 = 1 + \sin t, \quad 0 \le t \le 2\pi$$

$\boxed{\begin{array}{l}\text{Intersection: } (3, 0) \text{ and } (2.1, 1.4).\\ \text{No collision points.}\end{array}}$