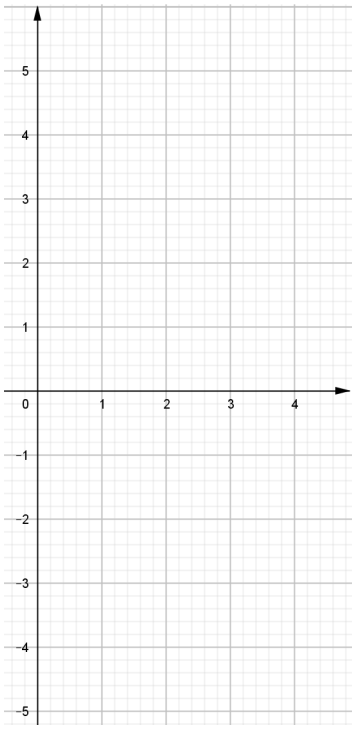
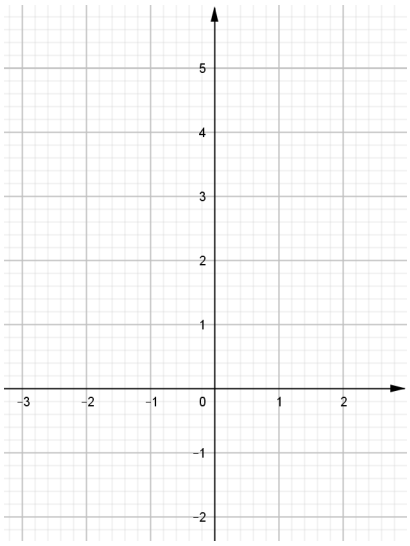
Sketch the curve by using the parametric equations to plot points. Indicate with an arrow the direction in which the curve is traced at t increases.

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

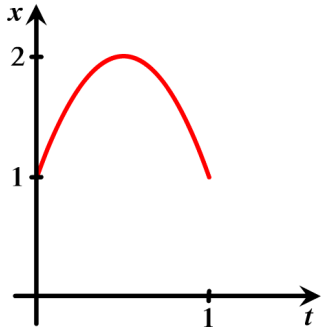
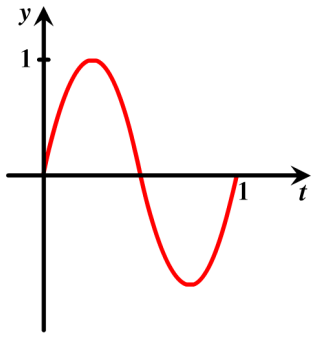
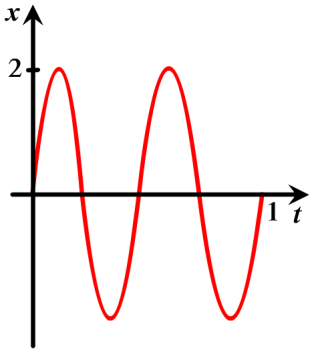
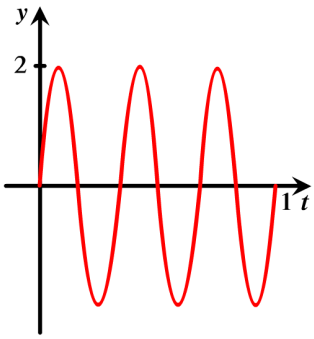
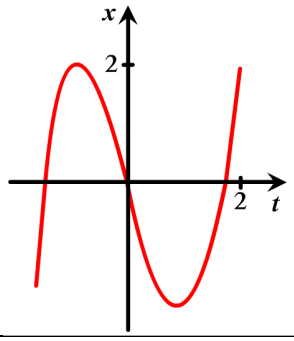
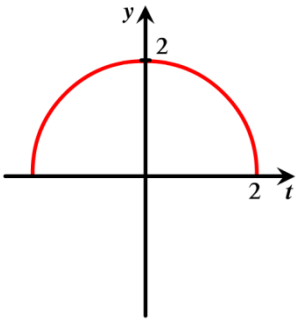
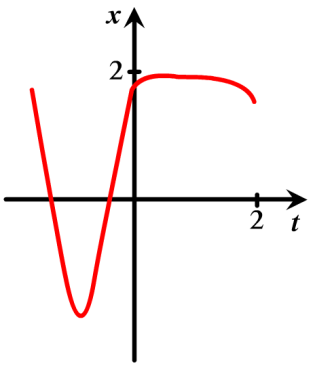
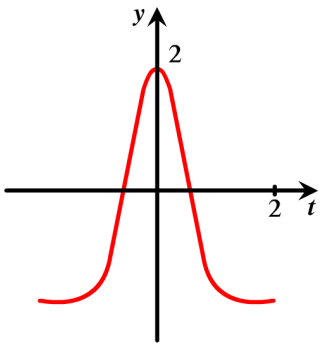
4) $x = t^2, \quad y = t^3$

5) $x = \sin\theta, \quad y = \cos\theta, \quad 0 \le \theta \le \pi$

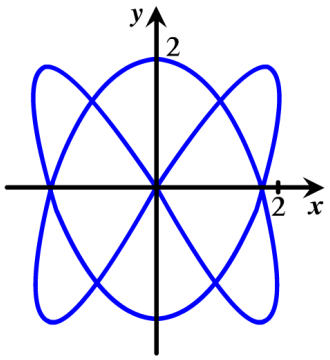
6) $x = \sin^2\theta, \quad y = \cos^2\theta$

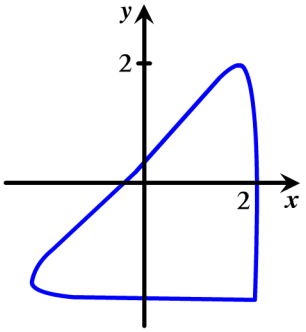
7) $x = \ln t, \quad y = \sqrt{t}, \quad t \geq 1$

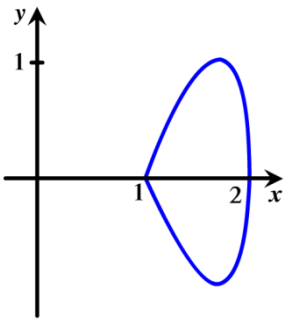
Match the graphs of the parametric equations $x = f(t)$ and $y = f(t)$ in (a)-(d) with the parametric curves labeled I-IV.

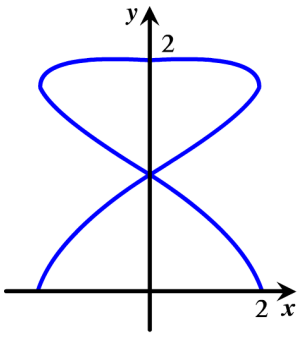
$x = f(t)$	$y = f(t)$
a) 	
b) 	
c) 	
d) 	

$y = f(x)$

I 

II 

III 

IV 

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

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

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

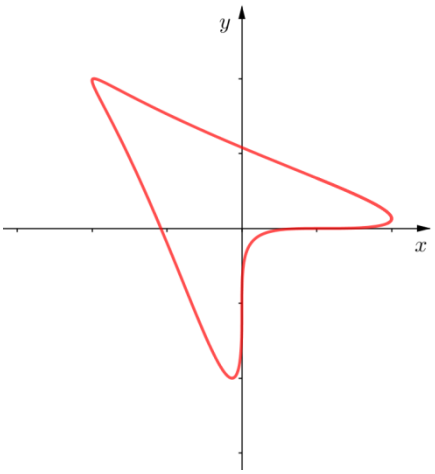
c) $x = \sin 3t, \quad y = \sin 4t$

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

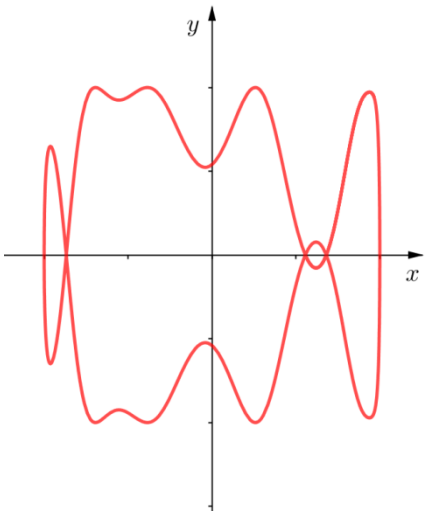
e) $x = \sin(t + \sin t), \quad y = \cos(t + \cos t)$

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

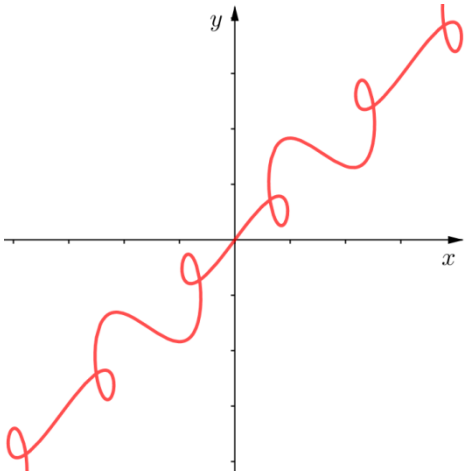
I



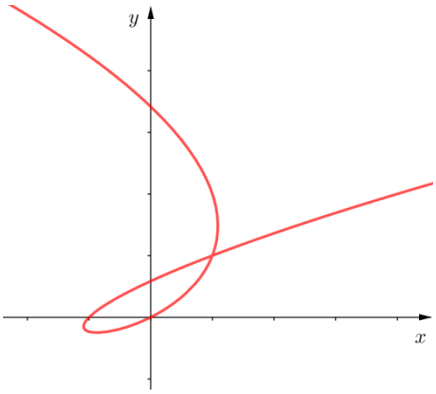
II



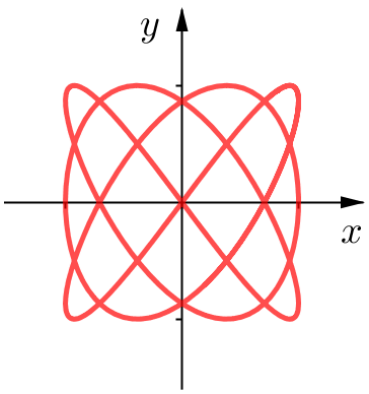
III



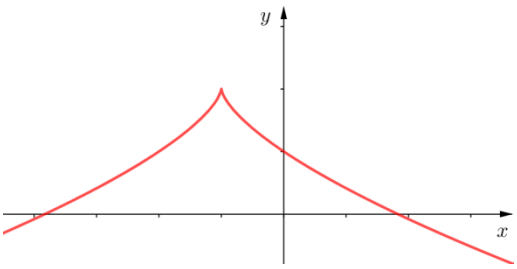
IV



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.

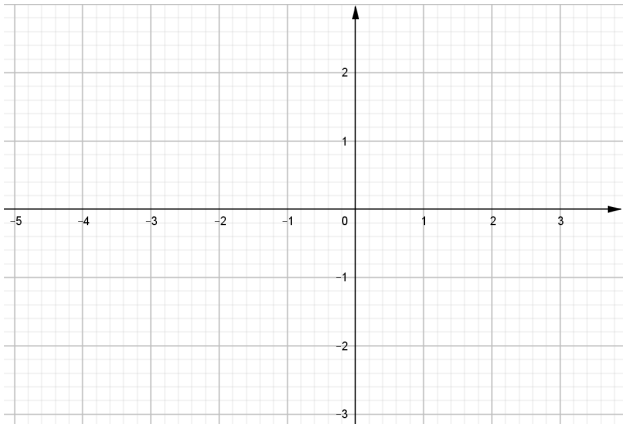
10) Suppose that the position of one particle at time t is given by:

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

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?



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.

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

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