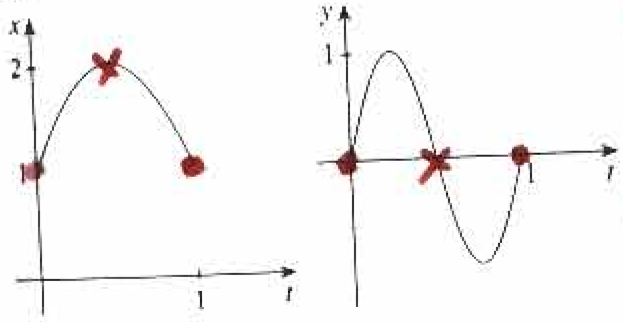
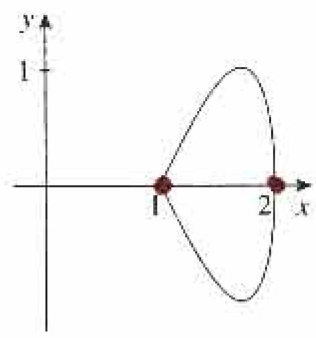
Hw 3
Selected solutions

10.1 24)

(a)

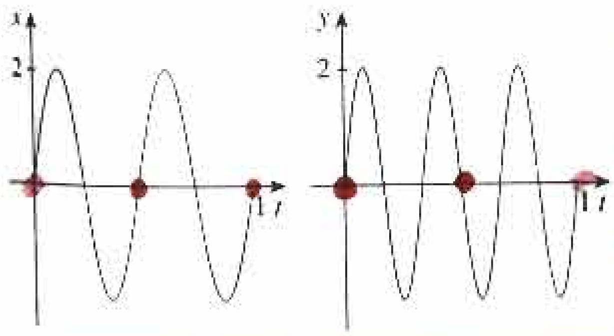


III

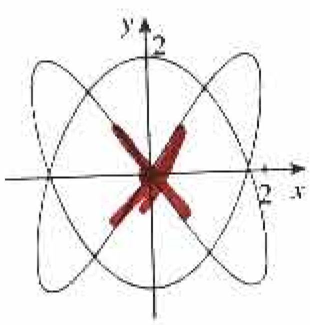


Ends where it starts (1,0)
passes through (2,0)

(b)



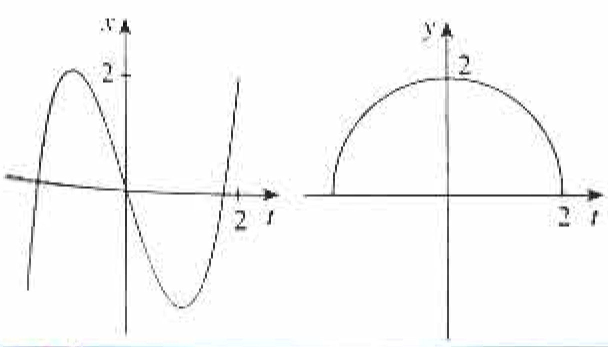
I



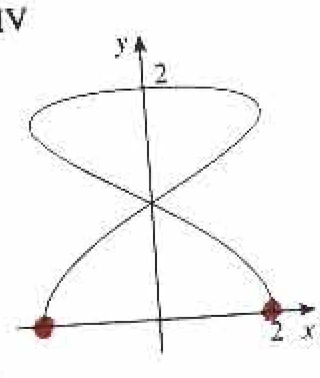
passes through (0,0) thrice

Passes through (0,0) twice & ends up there

(c)

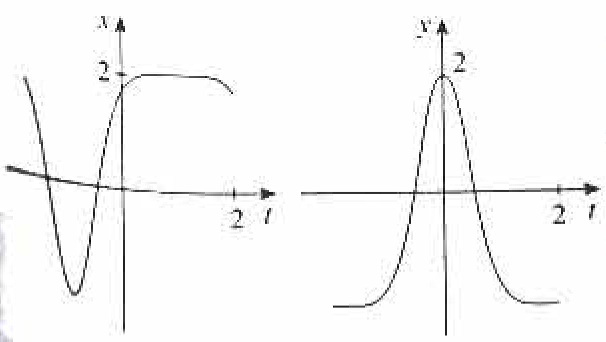


IV

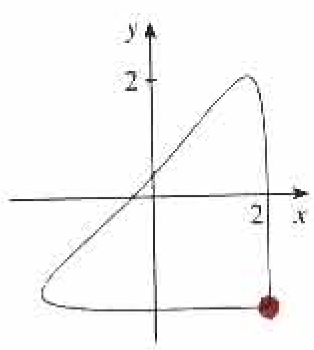


Doesn't end where it starts $(-2,0) \to (2,0)$

(d)



II



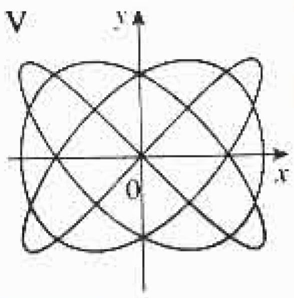
ends & starts at (2,-2)

28)

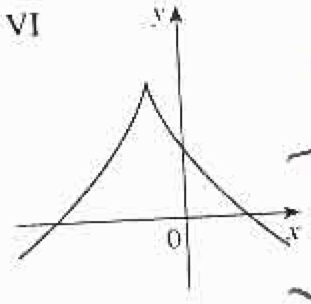
28. Match the parametric equations with the graphs labeled I–VI. Give reasons for your choices. (Do not use a graphing device.)

Periodic
I, II, V
c, e, f

passes (0,0)
III, IV, V
a, c, d

V


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

VI


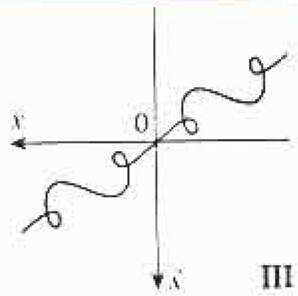
(b) $x = t^3 - 1, \quad y = 2 - t^2$

non periodic
III, IV, VI
a, b, d

does not pass (0,0)
I, II, VI
b, e, f

non periodic & ~~doesn't~~ passes (0,0)

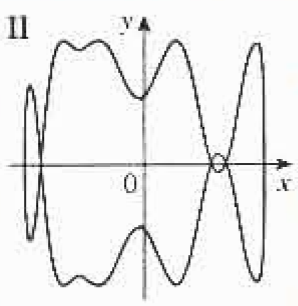
x and y go to ∞ and −∞ together


III

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

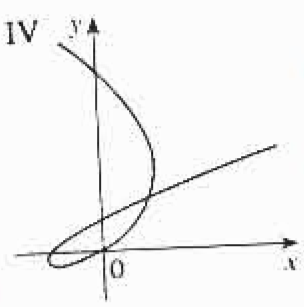
periodic ; does not pass (0,0)

passes through (−1, 0)
(at t = π)

II


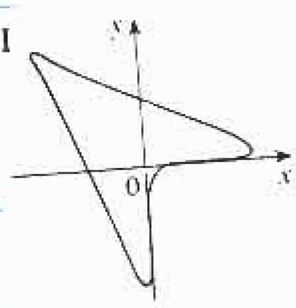
(f) $x = \cos t, \quad y = \sin(t + \sin 5t)$

x ~~and y~~ goes to ± ∞
y goes to + ∞ at both ends

IV


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

last one left!

I


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

12.5 58) Let $r_1 = \langle 1, 1, 0 \rangle + t\langle 1, -1, 2 \rangle$
$r_2 = \langle 2, 0, 2 \rangle + s\langle -1, 1, 0 \rangle$

a) Find point where lines r_1, r_2 intersect

Equate components:

$$\left.\begin{aligned} 1+t &= 2-s \\ 1-t &= 0 \\ 0+2t &= 2+0s \end{aligned}\right\} \Rightarrow \begin{aligned} t-1 &= -s \\ t &= 1 \end{aligned} \Rightarrow t=1,\ s=0$$

So $\langle 1, 1, 0 \rangle + 1\langle 1, -1, 2 \rangle = \langle 2, 0, 2 \rangle \in r_1$

and $\langle 2, 0, 2 \rangle + 0\langle -1, 1, 0 \rangle = \langle 2, 0, 2 \rangle \in r_2$

So they intersect at $(2, 0, 2)$.

b) Find the equation of the plane that contains these lines.

$(2,0,2) \in P$ and $P \parallel r_1$ and $P \parallel r_2$

ie $P \parallel \langle 1, -1, 2 \rangle$ and $P \parallel \langle -1, 1, 0 \rangle$

so $P \perp \langle 1, -1, 2 \rangle \times \langle -1, 1, 0 \rangle$

$$\begin{vmatrix} i & j & k \\ 1 & -1 & 2 \\ -1 & 1 & 0 \end{vmatrix} = i\begin{vmatrix} -1 & 2 \\ 1 & 0 \end{vmatrix} - j\begin{vmatrix} 1 & 2 \\ -1 & 0 \end{vmatrix} + k\begin{vmatrix} 1 & -1 \\ -1 & 1 \end{vmatrix}$$

$$= \langle -2, -2, 2 \rangle$$

so $-2x - 2y + 2z = \langle -2, -2, 2 \rangle \cdot \langle 2, 0, 2 \rangle$

$-2x - 2y + 2z = -4 + 4 = 0$

$\boxed{-x - y + z = 0}$

13.1 10) Sketch the curve $\langle 1+t, 3t, -t\rangle$ and indicate with an arrow the direction in which t increases.

This is a line $\langle 1,0,0\rangle + t\langle 1,3,-1\rangle$
so if we draw $t=0$ and $t=1$ and connect them we have our picture.

$t=0$: $\langle 1,0,0\rangle$

$t=1$: $\langle 2,3,-1\rangle$