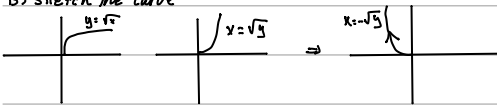


Q2 $x = \sqrt{t}, y = t, t \geq 0$

A) cartesian Eq. (relation between x and y)

$$x = -\sqrt{y}$$

B) sketch the curve



C) Direction

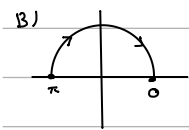
$$t \geq 0 \Rightarrow t_0 = 0 \Rightarrow (x, y) = (0, 0)$$

$$t_1 = 1 \Rightarrow (x, y) = (1, 1)$$

Q6 $x = \cos(\pi - t), y = \sin(\pi - t), 0 \leq t \leq \pi$

A) $\cos^2(\pi - t) + \sin^2(\pi - t) = 1$

$$x^2 + y^2 = 1$$



C) $t_0 = 0 \Rightarrow x = \cos(\pi) = -1, y = \sin(\pi) = 0 \Rightarrow (-1, 0)$

$$y = \sin(\pi) = 0$$

$$t_1 = \frac{\pi}{2} \Rightarrow x = \cos(\pi - \frac{\pi}{2}) = \cos(\frac{\pi}{2}) = 0$$

$$y = \sin(\pi - \frac{\pi}{2}) = \sin(\frac{\pi}{2}) = 1 \Rightarrow (0, 1)$$

Q7 $x = 4 \cos t, y = 2 \sin t, 0 \leq t \leq 2\pi$

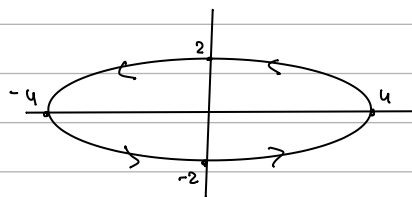
A) $\cos t = \frac{x}{4}, \sin t = \frac{y}{2}$

$$\cos^2 t + \sin^2 t = 1$$

$$\frac{x^2}{16} + \frac{y^2}{4} = 1$$

B)

t	x	y	(x, y)
0	$4 \cos 0 = 4$	$2 \sin 0 = 0$	(4, 0)
$\frac{\pi}{2}$	$4 \cos \frac{\pi}{2} = 0$	$2 \sin \frac{\pi}{2} = 2$	(0, 2)
π	$4 \cos \pi = -4$	$2 \sin \pi = 0$	(-4, 0)
$-\frac{\pi}{2}$	$4 \cos(-\frac{\pi}{2}) = 0$	$2 \sin(-\frac{\pi}{2}) = -2$	(0, -2)



Q10 $x = 1 + \sin t, y = \cos t - 2, 0 \leq t \leq \pi$

A) $\sin t = x - 1, \cos t = y + 2$

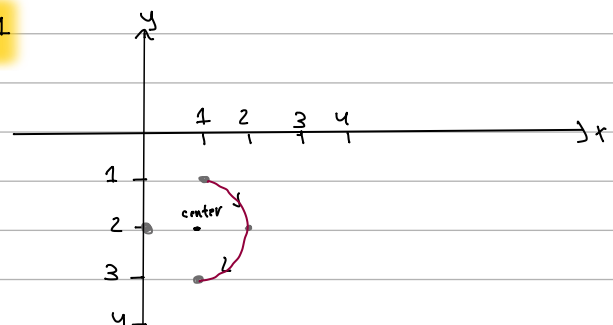
$$\sin^2 t = (x-1)^2, \cos^2 t = (y+2)^2$$

$$\sin^2 t + \cos^2 t = (x-1)^2 + (y+2)^2$$

$$1 = (x-1)^2 + (y+2)^2 \Rightarrow \text{a circle with center (1, -2) and a radius of 1}$$

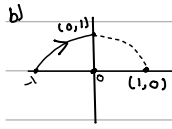
B)

t	x	y	(x, y)
0	$1 + \sin 0 = 1$	$\cos 0 - 2 = -1$	(1, -1)
$\pi/2$	$1 + \sin(\pi/2) = 2$	$\cos(\pi/2) - 2 = -2$	(2, -2)
π	$1 + \sin(\pi) = 1$	$\cos \pi - 2 = -3$	(1, -3)
$-\frac{\pi}{2}$	$1 + \sin(-\frac{\pi}{2}) = 0$	$\cos(-\pi/2) - 2 = -2$	(0, -2)



Q13 $x=t, y=\sqrt{1-t^2}, -1 \leq t \leq 0$

A) $y=\sqrt{1-x^2}$



c) $t=0 \Rightarrow x=0, y=1 \quad (0, 1)$

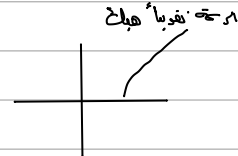
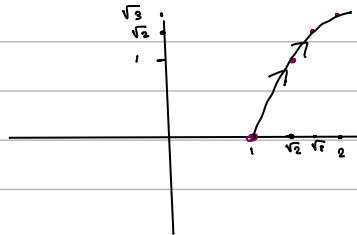
$t=1 \Rightarrow x=1, y=0 \quad (1, 0)$

Q14 $x=\sqrt{t+1}, y=\sqrt{t}, t \geq 0$

A) $y=\sqrt{t} \Rightarrow y^2=t \Rightarrow x=\sqrt{t+1} \Rightarrow x=\sqrt{y^2+1}$

B)

t	x	y	(x, y)
0	1	0	(1, 0)
1	$\sqrt{2}$	1	($\sqrt{2}, 1$)
2	$\sqrt{3}$	$\sqrt{2}$	($\sqrt{3}, \sqrt{2}$)
3	$\sqrt{4}=2$	$\sqrt{3}$	(2, $\sqrt{3}$)

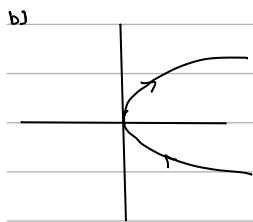


Q15 $x=\sec^2 t-1, y=\tan t, -\frac{\pi}{2} < t < \frac{\pi}{2}$

A) $\sec^2 t = x+1, \tan t = y$

* $\sec^2 t - \tan^2 t = 1$

$x+1 - y^2 = 1 \Rightarrow y^2 = x$



→ c) $t_0 = \frac{3\pi}{4} = 135^\circ \Rightarrow x = \sec^2(135) - 1 = -\sec^2(45) - 1 = \frac{1}{\sqrt{2}} - 1 = \frac{1-\sqrt{2}}{\sqrt{2}} \approx -1.71$

$y = \tan(135) = -\tan 45 = -1 \quad (-1.71, -1)$

$t_1 = 0 \Rightarrow x = \sec^2 0 - 1 = 1 - 1 = 0$

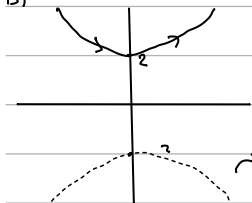
$y = \tan 0 = \sin 0 / \cos 0 = 0 \quad (1, 0)$

Q18 $x=2 \sinh t, y=2 \cosh t, -\infty < t < \infty$

* $\cosh^2 t - \sinh^2 t = 1$

$\frac{y^2}{4} - \frac{x^2}{4} = 1 \Rightarrow \frac{1}{4}(y^2 - x^2) = 1 \Rightarrow y^2 - x^2 = 4 \Rightarrow$ هذو منحنى هبل كالدق

B) hyperbola



هذو الجزء ما ناخذو منه لابل
و cosh مضمون يكون لابل

c) $t_0 = 0 \Rightarrow x = 2 \sinh 0 = 2 \frac{e^0 - e^{-0}}{2} = 2 \left(\frac{1-1}{2} \right) = 0$

$y = 2 \cosh 0 = 2 \left(\frac{e^0 + e^{-0}}{2} \right) = 2 \left(\frac{1+1}{2} \right) = 2$

$t_1 = 1 \Rightarrow x = 2 \sinh(1) = 2 \frac{e^1 - e^{-1}}{2}$

$y = 2 \cosh(1) = 2 \frac{e^1 + e^{-1}}{2}$

Q20 start at $(a, 0)$, , , $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

Q26 ray (half line) $\Rightarrow$ initial point $(-1, 2)$, that passes through the point $(0, 0)$

$$x = 1 + a \Rightarrow x = -1$$