

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

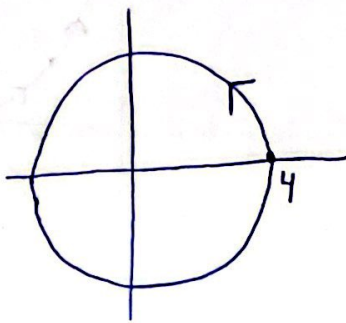
$\cos t = \frac{x}{4}$        $\sin t = \frac{y}{2}$

$\cos^2 t = \frac{x^2}{16}$        $\sin^2 t = \frac{y^2}{4}$

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

$t_0 = 0 \rightarrow (x, y) = (4, 0)$  TP = IP

$t_1 = 2\pi \rightarrow (x, y) = (4, 0)$



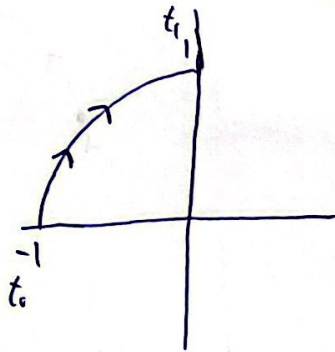
*Hayatun  
Shahadat*

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

$x^2 = t^2$        $y = \sqrt{1-x^2}$   
 $y^2 = 1-x^2$   
 $x^2 + y^2 = 1$

$t_0 = -1 \rightarrow (x, y) = (-1, 0)$

$t_1 = 0 \rightarrow (x, y) = (0, 1)$



16)  $x = -\sec t$ ,  $y = \tan t$

$-\frac{\pi}{2} < t < \frac{\pi}{2}$

$1 + \tan^2 t = \sec^2 t$

$x^2 = \sec^2 t$

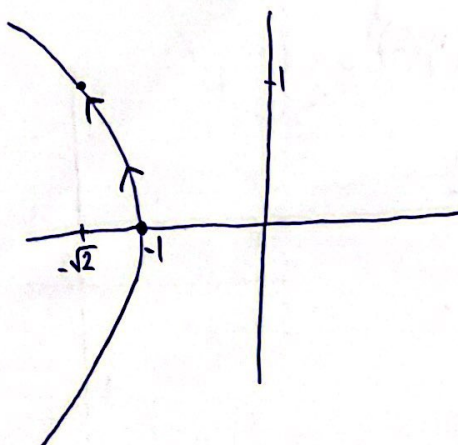
$y^2 = \tan^2 t$

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

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

$t_0 = 0 \rightarrow (x, y) = (-1, 0)$

$t_1 = \frac{\pi}{4} \rightarrow (x, y) = (-\sqrt{2}, 1)$



cos t  
 sec t  
 x < 0

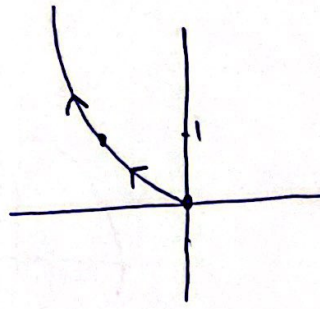
$$x = -\sqrt{t}, \quad y = t, \quad t \geq 0$$

$$2] \quad x^2 = t$$

$$x^2 = y$$

$$t_0 = 0 \rightarrow (0, 0)$$

$$t_1 = 1 \rightarrow (-1, 1)$$



$$x < 0$$

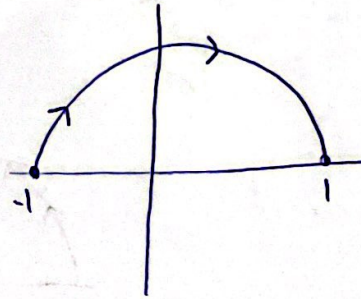
$$y > 0$$

$$6] \quad x = \cos(\pi - t), \quad y = \sin(\pi - t), \quad 0 \leq t \leq \pi$$

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

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

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



$$t_0 = 0 \rightarrow (-1, 0)$$

$$t_1 = \pi \rightarrow (1, 0)$$

$$10] \quad x = 1 + \sin t, \quad y = \cos t - 2, \quad 0 \leq t \leq \pi$$

$$\sin t = x - 1$$

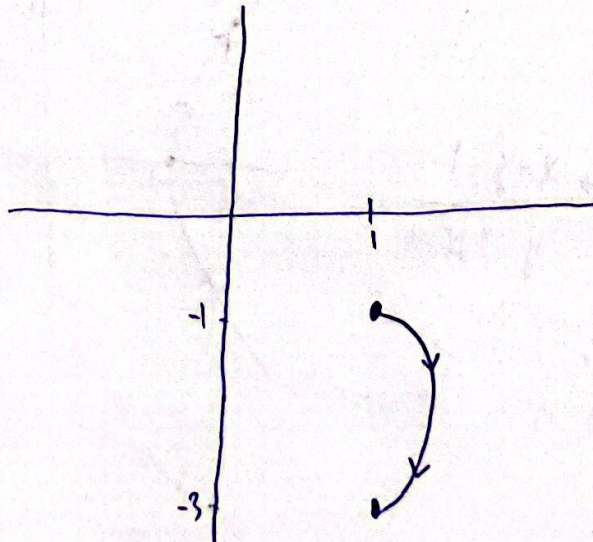
$$\cos t = y + 2$$

$$\sin^2 t = x^2 - 2x + 1$$

$$= (x - 1)^2$$

$$\cos^2 t = (y + 2)^2$$

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



$$t_0 = 0 \rightarrow (1, -1)$$

$$t_1 = \pi \rightarrow (1, -3)$$

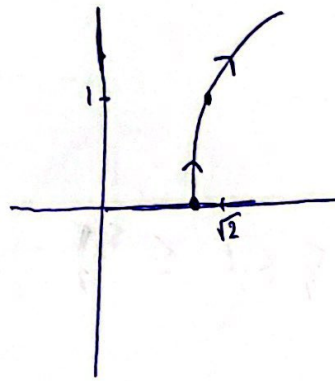
14)  $x = \sqrt{t+1}$  ,  $y = \sqrt{t}$  ,  $t \geq 0$

$y^2 = t$

$x = \sqrt{y^2+1}$

$t_0 = 0 \rightarrow (1, 0)$

$t_1 = 1 \rightarrow (\sqrt{2}, 1)$



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

$1 + \tan^2 t = \sec^2 t$

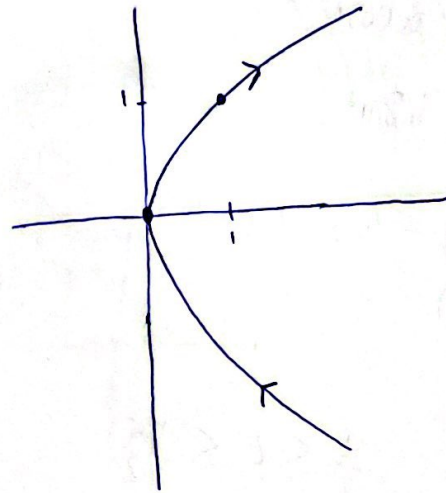
$\sec^2 t - 1 = \tan^2 t$

$y^2 = \tan^2 t$

$x = y^2$

$t_0 = 0 \rightarrow (0, 0)$

$t_1 = \frac{\pi}{4} \rightarrow (1, 1)$



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

$\sinh t = \frac{x}{2}$  ,  $\cosh t = \frac{y}{2}$

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

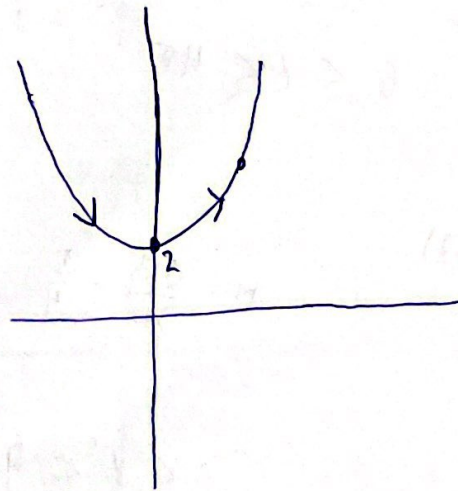
$\frac{y^2}{4} - \frac{x^2}{4} = 1$

$y^2 - x^2 = 4$

$y = \pm \sqrt{4+x^2}$

$t_0 = 0 \rightarrow (0, 2)$

$t_1 = \ln 2 \rightarrow (\frac{3}{2}, \frac{5}{2})$



$\sinh t = \frac{e^t - e^{-t}}{2}$

$\cosh t = \frac{e^t + e^{-t}}{2}$

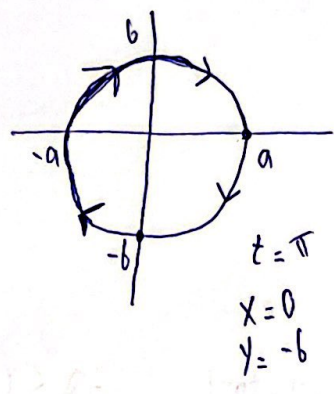
$2 \sinh(\ln 2) = \frac{2 - \frac{1}{2}}{2} = \frac{3}{4} \times 2 = \frac{3}{2}$

$2 \cosh(\ln 2) = \frac{2 + \frac{1}{2}}{2} = \frac{5}{2} \cdot \frac{1}{2} \cdot 2 = \frac{5}{2}$

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

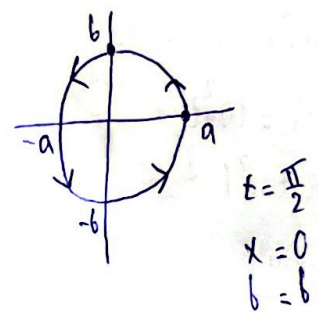
a)  $\frac{x}{a} = \sin t \rightarrow x = a \sin t$   
 $\frac{y}{b} = \cos t \rightarrow y = b \cos t$

$t = \frac{\pi}{2} \rightarrow (a, 0)$   
 $t = \frac{3\pi}{2} \rightarrow (a, 0)$   
 $\frac{\pi}{2} \leq t \leq \frac{3\pi}{2}$



b)  $\frac{x}{a} = \cos t \rightarrow x = a \cos t$   
 $\frac{y}{b} = \sin t \rightarrow y = b \sin t$

$t = 0 \rightarrow (a, 0)$   
 $t = 2\pi \rightarrow (a, 0)$   
 $0 \leq t \leq 2\pi$



c)  $x = a \sin t$   
 $y = b \cos t$   
 $\frac{\pi}{2} \leq t \leq \frac{3\pi}{2}$

d)  $x = a \cos t$   
 $y = b \sin t$   
 $0 \leq t \leq 4\pi$

22)  $(-1, 3)$   $(3, -2)$   
 $m = \frac{-2-3}{3+1} = \frac{-5}{4}$   
 $y - y_0 = m(x - x_0)$   
 $y - 3 = \frac{-5}{4}(x + 1)$   
 $0 \leq t \leq 4$   
 $x = t + a \rightarrow x = t - 1$   
 $y = b + mt \rightarrow y = 3 - \frac{5}{4}t$

23)  $(-1, 2)$   
 $x = t + a \rightarrow x = t - 1$   
 $y = b + mt \rightarrow y = 2 - 2t$   
 $t \geq 0$

