Pset 11

4E-2 $x = t + \frac{1}{t}$ $y = t - \frac{1}{t}$

$x^2 = t^2 + 2 + t^{-2}$ $y^2 = t^2 - 2 + t^{-2}$

$y^2 - x^2 = t^2 - 2 + t^{-2} - (t^2 + 2 + t^{-2})$

$y^2 - x^2 = -4$

$x^2 - y^2 = 4$ ✓

4E-3 $x = 1 + \sin t$ $y = 4 + \cos t$

$(1+\sin t)^2 + (4+\cos t)^2 = 1 + 2\sin t + \sin^2 t + 16 + 8\cos t + \cos^2 t$

$\Rightarrow (1 + 16 + \sin^2 t + \cos^2 t) + 2\sin t + 8\cos t$

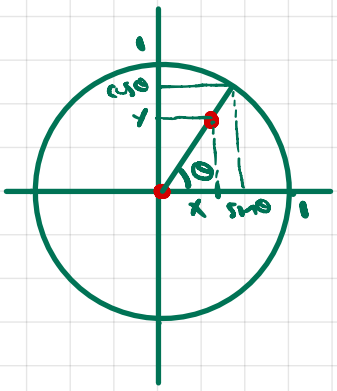
$\Rightarrow x^2 + y^2 = 18 + 2\sin t + 8\cos t = 18 + 2(x-1) + 8(y-4) = 18 - 2 - 32 + 2x + 8y$

$\Rightarrow x^2 - 2x + y^2 - 8y = -16$

$(x^2 - 2x + 1) + (y^2 - 8y + 16) = -16 + 16 + 1$

$\Rightarrow (x-1)^2 + (y-4)^2 = 1$ ✓

4E-8



$\theta(t) = \frac{\pi}{2} - \frac{3\pi}{12}t = \frac{6\pi - 2\pi t}{12} = \frac{3\pi - \pi t}{6} = \frac{\pi}{6}(3-t)$

$\theta(1) = \frac{\pi}{3}$

$r(1) = 1, r(0) = 0, r(t) = t$

$r(t) = t$
$\theta(t) = \frac{\pi}{6}(3-t)$ $\Rightarrow \theta = \frac{\pi}{6}(3-r) \Rightarrow 6\theta = 3\pi - \pi r$

$\Rightarrow \pi r = 3\pi - 6\theta \Rightarrow r = 3 - \frac{6}{\pi}\theta$

$x = r\cos\theta = t \cdot \cos\left[\frac{\pi}{6}(3-t)\right]$ ✓

$y = r\sin\theta = t \cdot \sin\left[\frac{\pi}{6}(3-t)\right]$