8. The position of a moving particle at time t is given by the position vector

$$\vec{r}(t) = 3\sin t\,\vec{i} + 4\cos t\,\vec{j}$$

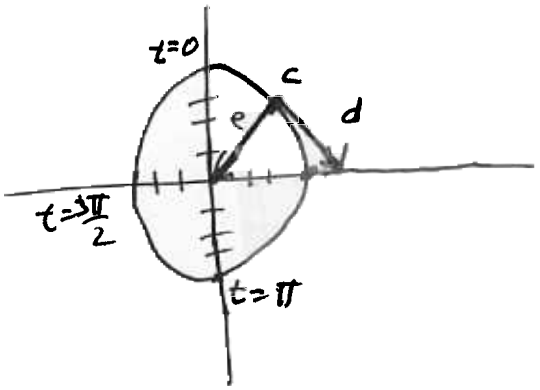
(a) Graph the path of the object.
(b) Eliminate the parameter and express the path of the object in cartesian coordinates.
(c) Which point on the curve corresponds to $t = \frac{\pi}{4}$?
(d) Draw $\vec{v}(\frac{\pi}{4})$. Put the tail on your answer to (c).
(e) Draw $\vec{a}(\frac{\pi}{4})$. Put the tail on your answer to (c).

(9)

$X = 3\sin t \quad Y = 4\cos t$

$\frac{X^2}{9} + \frac{Y^2}{16} = \sin^2 t + \cos^2 t = 1$

$\frac{X^2}{9} + \frac{Y^2}{16} = 1$ b



$\vec{v}(t) = 3\cos t\,\vec{i} - 4\sin t\,\vec{j}$

$\vec{v}(\frac{\pi}{4}) = 3\frac{\sqrt{2}}{2}\vec{i} - 4\frac{\sqrt{2}}{2}\vec{j}$

The position at time $\frac{\pi}{4}$ is $\left(\frac{3\sqrt{2}}{2}, \frac{4\sqrt{2}}{2}\right)$

$\vec{a}(t) = -3\sin t\,\vec{i} - 4\cos t\,\vec{j}$

$\vec{a}(\frac{\pi}{4}) = -3\frac{\sqrt{2}}{2}\vec{i} - 4\frac{\sqrt{2}}{2}\vec{j}$