12. $\vec{r}(t) = 3\cos t\,\vec{i} + 3\sin t\,\vec{j}$ $\quad t_0 = \frac{\pi}{2}$

$\vec{r}\,'(t) = -3\sin t\,\vec{i} + 3\cos t\,\vec{j}$

$\vec{r}\,'\left(\frac{\pi}{2}\right) = -3\sin\frac{\pi}{2}\,\vec{i} + 3\cos\frac{\pi}{2}\,\vec{j}$

$= -3\vec{i}$

$\|\vec{r}\,'\left(\frac{\pi}{2}\right)\| = \sqrt{(-3)^2} = \sqrt{9} = 3$

So $\vec{T}\left(\frac{\pi}{2}\right) = \dfrac{\vec{r}\,'\left(\frac{\pi}{2}\right)}{\|\vec{r}\,'\left(\frac{\pi}{2}\right)\|} = \dfrac{-3\vec{i}}{3} = \boxed{-\vec{i}}$

$\vec{N}\left(\frac{\pi}{2}\right) = \boxed{-\vec{j}}$

$x = 3\cos t \qquad y = 3\sin t$

$\frac{x}{3} = \cos t \qquad \frac{y}{3} = \sin t$

$\frac{x^2}{9} = \cos^2 t \qquad \frac{y^2}{9} = \sin^2 t$

$\frac{x^2}{9} + \frac{y^2}{9} = \cos^2 t + \sin^2 t$

$\frac{x^2}{9} + \frac{y^2}{9} = 1$

$x^2 + y^2 = 9$